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ONE-SIDED TOLERANCE LIMIT TABLES

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PREPARED BY

QUALITY EVALUATION LABORATORY DEPARTMENT

NAVAL AMMUNITION DEPOT, CRANE, INDIANA

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ABSTRACT

The tables list K factors used to compute one-sided tolerance limits which can be represented by $\bar{x} + Ks$ or $\bar{x} - Ks$ (upper or lower limits, respectively). Tables are presented with entry by sample size, proportion of population covered, and confidence coefficient. The tables list K factors for n = 3 (1) 50 (5) 100 (10) 200, 250, 300 (100) 1000, 9999, and 50000; for proportion of population covered of .50 (.01) .99, .995, .999; and for confidence coefficients of .90, .95, and .99. Examples of the use of the tables are also included.

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ONE-SIDED TOLERANCE LIMIT TABLES

I. INTRODUCTION

Upper and lower 100 (1-α) percent confidence limits may be constructed with the property that when we say these limits include the true value of the parameter, 100 (1-α) percent of all such statements will be correct [1]. For example, the case of the mean [for sample size (n) larger than 29] can be represented as $\bar{x} \pm ks$ where $\bar{x}$ is the mean, k is the corresponding normal deviate divided by $\sqrt{n}$, and s is the sample standard deviation.

Sometimes it is useful to obtain an interval that covers a fixed proportion of the population distribution with a desired confidence. These intervals are called tolerance intervals and may be constructed such that the interval covers a proportion of the population with a desired confidence. This can be represented by $\bar{x} \pm Ks$ where K is the tolerance factor. As the sample size increases the value of k for confidence intervals approaches zero while K for tolerance intervals approaches the normal deviate that includes the desired proportion of the universe.

Tolerance limits are based on the assumption that the underlying statistical universe is normally distributed. Since μ (the population mean) and σ (the population standard deviation) are not known, the tolerance limits must be based on $\bar{x}$ and s from a random sample of n observations. The quantities $\bar{x}$ and s are random variables and hence the limit depends on the particular outcome of the sample. Different samples

may lead to different limits. Some situations necessitate the use of one-sided tolerance limits (upper or lower) which can be represented by $\bar{x} + Ks$ or $\bar{x} - Ks$. These K values are given in Tables I, II, and III.

Various approximations have been used to calculate K values. Owen [4] [5] discusses the accuracy of four different approximation methods. The enclosed tables are based on the non-central t-distribution and make the use of approximations unnecessary.

II. COVERAGE OF TABLES

Factors K such that $\bar{x} + Ks$ or $\bar{x} - Ks$ is a one-sided tolerance limit for a normally distributed population are given in Table I for 90% confidence, Table II for 95% confidence, and Table III for 99% confidence. These are given for n = 3 (1) 50, 55 (5) 100, 110 (10) 200, 250, 300 (100) 1000, 9999, 50000 and for proportion of population covered of .50 (.01) .99, .995, .999.

III. EXAMPLE OF USE OF TABLES

A manufacturer of fuzes would like to specify a single lower limit above which he can be assured with a probability of 95% that at least 99% of his production will lie. A random sample of 30 fuzes is taken and the sample mean and standard deviation are found to be 605.1 and 12.65, respectively. A value of K = 3.064 corresponding to n = 30 with 95% probability and 99% of population covered is obtained from Table II. The required lower tolerance limit is given by $\bar{x}-Ks = 605.1-(3.064)(12.65) = 566.3$.

The manufacturer would also like to know with 95% probability what percent of his production will lie above 579.8 using the above data. The K value will be $\frac{\bar{x}-L}{s} = \frac{605.1 - 579.8}{12.65} = \frac{25.3}{12.65} = 2.00$. Table II is searched at n = 30 for 2.00. The .93 proportion of population covered column has K = 2.013 and the .92 column has K = 1.927. A conservative statement would be that the manufacturer can be assured with a probability of 95% that at least 92% of his production will lie above 579.8. Linear interpolation, if necessary, with respect to the proportion of population covered is considered appropriate to use since only small errors can result. More accurate interpolation is accomplished by interpolating with respect to the normal deviate corresponding to the proportion of population covered.

IV. CONTRUCTION OF TABLES

The values of K given in the tables correspond to percentage points (divided by the square root of n) of the non-central t-distribution. The non-central t statistic, $t_{n-1,\sqrt{n}K_\alpha}$ has n-1 degrees of freedom and non-centrality parameter $\sqrt{n}K_\alpha$. K_α is defined by

$$1/\sqrt{2\pi}\int_{K_\alpha}^{\infty} e^{-z^2/2}\,dz = \alpha.$$

To find K, determine t_o such that $P[t_{n-1,\sqrt{n}K_\alpha} > t_o] = 1 - \gamma$. Let $K = t_o/\sqrt{n}$ [3]. Then $\bar{x} + Ks$ and $\bar{x} - Ks$ are upper one-sided and lower one-sided tolerance limits, respectively. It can be stated with $100\gamma\%$ confidence that at least $100(1-\alpha)\%$ of the distribution will be less than $\bar{x} + Ks$ (or greater than $\bar{x} - Ks$).

Table IV of Johnson and Welch [2] was used to compute the non-centrality parameter of the non-central t-distribution. An iteration method was necessary and this was performed, in single precision, on a Honeywell 2200 Computer (65K storage). The value ∞ was replaced by 100,000 so interpolation could be performed. The following steps were used:

A. Determine K_α, the normal deviate exceeded with probability α.

B. Calculate $\delta = \sqrt{n}K_\alpha$, the non-centrality parameter of the non-central t-distribution, and $f = n-1$, the number of degrees of freedom.

C. Determine $Z_{(1-\gamma)}$, the normal deviate exceeded with probability $1-\gamma$.

D. Calculate the first approximation t_1 by

$$\frac{\delta + Z_{(1-\gamma)}\sqrt{1 + \frac{\delta^2}{2f} - \frac{Z^2_{(1-\gamma)}}{2f}}}{1 - \frac{Z^2_{(1-\gamma)}}{2f}}$$

E. Calculate $\frac{t_1}{\sqrt{2f}}$

F. Find $y = \frac{1}{\sqrt{1 + \frac{t_1^2}{2f}}}$ if $\left|\frac{t_1}{\sqrt{2f}}\right|$ is greater than 0.75 or

$$y' = \frac{t_1/\sqrt{2f}}{\sqrt{1 + \frac{t_1^2}{2f}}} \quad \text{if} \left|\frac{t_1}{\sqrt{2f}}\right| \text{is less than 0.75.}$$

G. Obtain $\lambda_1 = \lambda(f, t_1, 1-\gamma)$ from Table IV of Johnson and Welch

H. Calculate a second approximation t_2 where

$$t_2 = \frac{\delta + \lambda_1\sqrt{1 + \frac{\delta^2}{2f} - \frac{\lambda_1^2}{2f}}}{1 - \frac{\lambda_1^2}{2f}}$$

I. Repeat steps (E) through (H) replacing t_1 by t_2 and calculate a third approximation. Repeat these steps until two successive approximations are the same. Take for $t(f, \delta, 1-\gamma)$ the value so obtained.

J. Calculate $K = \frac{t(f, \delta, 1-\gamma)}{\sqrt{n}}$.

V. ACCURACY

The results in the enclosed tables should be accurate to within .005 and rarely more than .002 from the true value.

ACKNOWLEDGEMENTS

Appreciation is expressed to William Larkin of the Data Processing Department who wrote the Exact One-Sided Tolerance Limit Program and to the Data Processing Department for providing the computer time.

REFERENCES

1. Brownlee, K. A. Statistical Theory and Methodology in Science and Engineering Wiley, New York, 1960, p. 121.

2. Johnson, N. L. and Welch, B. L., "Application of the Non entral t-Distribution" Biometrika (1940), 31

3. Lieberman, Gerald J., "Tables for One-Sided Statistical Tolerance Limits" Technical Report No. 34 Contract N60nr-25126 (NR-042-002) (1957) Office of Naval Research

4. Owen, D. B., "A Survey of Properties and Applications of the Non-Central t-Distribution," Technometrics Vol. 10, No. 3, August 1968, pp. 445-478

5. Owen, Donald B., "Tables of Factors for One-Sided Tolerance Limits For a Normal Distribution," AEC Contract AT-(29-1)-789 (1958)

6. Resnikoff, George J., "Tables to Facilitate the Computation of Percentage Points of the Non-Central t-Distribution," Technical Report No. 55 Contract Nonr-225 (53) (NR-042-002) (1961) Office of Naval Research

TABLE I

FACTORS OF ONE-SIDED TOLERANCE LIMITS FOR A NORMAL DISTRIBUTION

90% CONFIDENCE

Proportion of Population Covered — ➤

	.50	.51	.52	.53	.54	.55	.56	.57	.58	.59	.60	.61	.62	.63	.64	.65	.66	.67
N= 3	1.089	1.136	1.184	1.234	1.283	1.334	1.386	1.439	1.492	1.547	1.602	1.659	1.717	1.776	1.836	1.898	1.961	2.025
N= 4	.819	.856	.895	.933	.972	1.012	1.052	1.093	1.135	1.177	1.219	1.263	1.307	1.352	1.398	1.445	1.492	1.541
N= 5	.686	.719	.753	.788	.823	.858	.894	.930	.967	1.004	1.042	1.080	1.119	1.158	1.198	1.239	1.281	1.323
N= 6	.602	.634	.666	.698	.731	.764	.797	.831	.865	.900	.935	.970	1.006	1.043	1.080	1.118	1.156	1.195
N= 7	.544	.575	.605	.636	.667	.699	.731	.763	.795	.828	.862	.896	.930	.965	1.000	1.036	1.072	1.109
N= 8	.500	.530	.560	.590	.620	.650	.681	.712	.744	.776	.808	.841	.874	.907	.941	.976	1.011	1.047
N= 9	.466	.494	.524	.553	.583	.612	.643	.673	.704	.731	.766	.798	.830	.863	.896	.930	.964	.999
N= 10	.437	.466	.494	.523	.552	.582	.611	.641	.671	.702	.732	.764	.795	.827	.860	.893	.926	.960
N= 11	.414	.442	.470	.499	.527	.556	.585	.615	.644	.674	.705	.735	.766	.798	.830	.862	.895	.928
N= 12	.394	.421	.449	.478	.506	.534	.563	.592	.622	.651	.681	.711	.742	.773	.804	.836	.869	.902
N= 13	.376	.404	.431	.459	.487	.516	.544	.573	.602	.631	.661	.691	.721	.752	.783	.814	.846	.879
N= 14	.361	.388	.416	.443	.471	.499	.528	.556	.585	.614	.643	.673	.703	.733	.764	.795	.827	.859
N= 15	.347	.374	.402	.429	.457	.485	.513	.541	.570	.598	.628	.657	.687	.717	.747	.778	.810	.841
N= 16	.335	.362	.389	.417	.444	.472	.500	.528	.556	.585	.614	.643	.672	.702	.733	.763	.794	.826
N= 17	.324	.351	.378	.405	.433	.460	.488	.516	.544	.572	.601	.630	.660	.689	.719	.750	.781	.812
N= 18	.314	.341	.368	.395	.422	.450	.477	.505	.533	.561	.590	.619	.648	.678	.707	.738	.769	.800
N= 19	.305	.332	.359	.386	.413	.440	.468	.495	.523	.551	.580	.608	.638	.667	.697	.727	.757	.788
N= 20	.297	.324	.350	.377	.404	.431	.459	.486	.514	.542	.570	.599	.628	.657	.687	.717	.747	.778
N= 21	.289	.316	.342	.369	.396	.423	.450	.478	.506	.534	.562	.590	.619	.648	.678	.708	.738	.769
N= 22	.282	.309	.335	.362	.389	.416	.443	.470	.498	.526	.554	.582	.611	.640	.669	.699	.729	.760
N= 23	.276	.302	.328	.355	.382	.409	.436	.463	.491	.518	.546	.575	.603	.632	.662	.691	.721	.752
N= 24	.269	.296	.322	.349	.375	.402	.429	.457	.484	.512	.540	.568	.596	.625	.654	.684	.714	.744
N= 25	.264	.290	.316	.343	.369	.396	.423	.450	.478	.505	.533	.561	.590	.618	.648	.677	.707	.737
N= 26	.258	.284	.311	.337	.364	.391	.417	.445	.472	.499	.527	.555	.584	.612	.641	.671	.700	.731
N= 27	.253	.279	.306	.332	.358	.385	.412	.439	.466	.494	.522	.550	.578	.606	.635	.665	.694	.724
N= 28	.248	.274	.301	.327	.354	.380	.407	.434	.461	.489	.516	.544	.572	.601	.630	.659	.689	.719
N= 29	.244	.270	.296	.322	.349	.375	.402	.429	.456	.484	.511	.539	.567	.596	.625	.654	.683	.713
N= 30	.239	.266	.292	.318	.344	.371	.398	.424	.452	.479	.506	.534	.562	.591	.620	.649	.678	.708
N= 31	.235	.261	.288	.314	.340	.367	.393	.420	.447	.474	.502	.530	.558	.586	.615	.644	.673	.703
N= 32	.231	.257	.284	.310	.336	.363	.389	.416	.443	.470	.498	.525	.553	.582	.610	.639	.669	.699
N= 33	.228	.254	.280	.306	.332	.359	.385	.412	.439	.466	.494	.521	.549	.578	.606	.635	.664	.694
N= 34	.224	.250	.276	.302	.329	.355	.382	.408	.435	.462	.490	.517	.545	.574	.602	.631	.660	.690
N= 35	.221	.247	.273	.299	.325	.352	.378	.405	.432	.459	.486	.514	.542	.570	.598	.627	.656	.686
N= 36	.218	.244	.270	.296	.322	.348	.375	.401	.428	.455	.483	.510	.538	.566	.595	.623	.653	.682
N= 37	.215	.240	.266	.292	.319	.345	.371	.398	.425	.452	.479	.507	.535	.563	.591	.620	.649	.678
N= 38	.212	.237	.263	.289	.316	.342	.368	.395	.422	.449	.476	.504	.531	.559	.588	.616	.646	.675
N= 39	.209	.235	.261	.287	.313	.339	.365	.392	.419	.446	.473	.500	.528	.556	.584	.613	.642	.672
N= 40	.206	.232	.258	.284	.310	.336	.363	.389	.416	.443	.470	.497	.525	.553	.581	.610	.639	.668
N= 41	.203	.229	.255	.281	.307	.333	.360	.386	.413	.440	.467	.495	.522	.550	.578	.607	.636	.665
N= 42	.201	.227	.253	.279	.305	.331	.357	.384	.410	.437	.464	.492	.519	.547	.576	.604	.633	.662
N= 43	.199	.224	.250	.276	.302	.328	.355	.381	.408	.435	.462	.489	.517	.545	.573	.601	.630	.660
N= 44	.196	.222	.248	.274	.300	.326	.352	.379	.405	.432	.459	.487	.514	.542	.570	.599	.628	.657
N= 45	.194	.220	.245	.271	.297	.324	.350	.376	.403	.430	.457	.484	.512	.540	.568	.596	.625	.654
N= 46	.192	.217	.243	.269	.295	.321	.348	.374	.401	.427	.454	.482	.509	.537	.565	.594	.622	.652
N= 47	.190	.215	.241	.267	.293	.319	.345	.372	.398	.425	.452	.479	.507	.535	.563	.591	.620	.649
N= 48	.188	.213	.239	.265	.291	.317	.343	.370	.396	.423	.450	.477	.505	.532	.561	.589	.618	.647
N= 49	.186	.211	.237	.263	.289	.315	.341	.368	.394	.421	.448	.475	.502	.530	.558	.587	.615	.645
N= 50	.184	.209	.235	.261	.287	.313	.339	.365	.392	.419	.446	.473	.500	.528	.556	.585	.613	.642
N= 55	.175	.201	.226	.252	.278	.304	.330	.356	.383	.409	.436	.463	.491	.518	.546	.575	.603	.632
N= 60	.167	.193	.219	.244	.270	.296	.322	.348	.375	.401	.428	.455	.482	.510	.538	.565	.595	.623
N= 65	.161	.186	.212	.237	.263	.289	.315	.341	.368	.394	.421	.448	.475	.503	.530	.558	.587	.616
N= 70	.155	.180	.206	.231	.257	.283	.309	.335	.361	.388	.415	.441	.469	.496	.524	.552	.580	.609
N= 75	.149	.175	.200	.226	.252	.277	.303	.329	.356	.382	.409	.436	.463	.490	.518	.546	.574	.603
N= 80	.144	.170	.195	.221	.247	.272	.298	.324	.351	.377	.404	.430	.458	.485	.513	.540	.569	.598

N= 13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
N= 14	.361	.388	.416	.443	.471	.499	.528	.556	.555	.614	.643	.673	.703	.733	.764	.795	.827	.859
N= 15	.347	.374	.402	.429	.457	.485	.513	.541	.570	.598	.628	.657	.687	.717	.747	.778	.810	.841
N= 16	.335	.362	.389	.417	.444	.472	.500	.528	.556	.585	.614	.643	.672	.702	.733	.763	.794	.826
N= 17	.324	.351	.378	.405	.433	.460	.488	.516	.544	.572	.601	.630	.660	.689	.719	.750	.781	.812
N= 18	.314	.341	.368	.395	.422	.450	.477	.505	.533	.561	.590	.619	.648	.678	.707	.738	.769	.800
N= 19	.305	.332	.359	.386	.413	.440	.468	.495	.523	.551	.580	.608	.638	.667	.697	.727	.757	.788
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N= 22	.282	.309	.335	.362	.389	.416	.443	.470	.498	.526	.554	.582	.611	.640	.669	.699	.729	.760
N= 23	.276	.302	.328	.355	.382	.409	.436	.463	.491	.518	.546	.575	.603	.632	.662	.691	.721	.752
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N= 28	.248	.274	.301	.327	[illegible]	.380	.407	.434	.461	.489	.516	.544	.572	.601	.630	.659	.689	.719
N= 29	.244	.270	.296	.322	.349	.375	.402	.429	.456	.484	.511	.539	.567	.596	.625	.654	.683	.713
N= 30	.239	.266	.292	.318	.344	.371	.398	.424	.452	.479	.506	.534	.562	.591	.620	.649	.678	.708
N= 31	.235	.261	.288	.314	.340	.367	.393	.420	.447	.474	.502	.530	.558	.586	.615	.644	.673	.703
N= 32	.231	.257	.284	.310	.336	.363	.389	.416	.443	.470	.498	.525	.553	.582	.610	.639	.669	.699
N= 33	.228	.254	.280	.306	.332	.359	.385	.412	.439	.466	.494	.521	.549	.578	.606	.635	.664	.694
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N= 39	.209	.235	.261	.287	.313	.339	.365	.392	.419	.446	.473	.500	.528	.556	.584	.613	.642	.672
N= 40	.206	.232	.258	.284	.310	[illegible]	.363	.389	.416	.443	.470	.497	.525	.553	.581	.610	.639	.668
N= 41	.203	.229	.255	.281	.307	.333	.360	.386	.413	.440	.467	.495	.522	.550	.578	.607	.636	.665
N= 42	.201	.227	.253	.279	.305	.331	.357	.384	.410	.437	.464	.492	.519	.547	.576	.604	.633	.662
N= 43	.199	.224	.250	.276	.302	.328	.355	.381	.408	.435	.462	.489	.517	.545	.573	.601	.630	.660
N= 44	.196	.222	.248	.274	.300	.326	.352	.379	.405	.432	.459	.487	.514	.542	.570	.599	.628	.657
N= 45	.194	.220	.245	.271	.297	.324	.350	.376	.403	.430	.457	.484	.512	.540	.568	.596	.625	.654
N= 46	.192	.217	.243	.269	.295	.321	.348	.374	.401	.427	.454	.482	.509	.537	.565	.594	.622	.652
N= 47	.190	.215	.241	.267	.293	.319	.345	.372	.398	.425	.452	.479	.507	.535	.563	.591	.620	.649
N= 48	.188	.213	.239	.265	.201	.317	.343	.370	.396	.423	.450	.477	.505	.632	.561	.589	.618	.647
N= 49	.186	.211	.237	.263	.289	.315	.341	.368	.394	.421	.448	.475	.502	.530	.558	.587	.615	.645
N= 50	.184	.209	.235	.261	.287	.313	.339	.365	.392	.419	.446	.473	.500	.528	.556	.585	.613	.642
N= 55	.175	.201	.226	.252	.278	.304	.330	.356	.383	.409	.436	.463	.491	.518	.546	.575	.603	.632
N= 60	.167	.193	.219	.244	.270	.296	.322	.348	.375	.401	.428	.455	.482	.510	.538	.566	.595	.623
N= 65	.161	.186	.212	.237	.263	.289	.315	.341	.368	.394	.421	.448	.475	.503	.530	.558	.587	.616
N= 70	.155	.180	.206	.231	.257	.283	.309	.335	.361	.388	.415	.441	.469	.496	.524	.552	.580	.609
N= 75	.149	.175	.200	.226	.252	.277	.303	.329	.356	.382	.409	.436	.463	.490	.518	.546	.574	.603
N= 80	.144	.170	.195	.221	.247	.272	.298	.324	.351	.377	.404	.430	.458	.485	.513	.540	.569	.597
N= 85	.140	.166	.191	.217	.242	.268	.294	.320	.346	.372	.399	.426	.453	.480	.508	.536	.564	.592
N= 90	.136	.161	.187	.212	.236	.264	.290	.316	.342	.368	.395	.421	.448	.476	.503	.531	.559	.588
N= 95	.132	.158	.183	.209	.234	.260	.286	.312	.338	.364	.391	.418	.444	.472	.499	.527	.555	.584
N= 100	.129	.154	.180	.205	.231	.257	.282	.308	.334	.361	.387	.414	.441	.468	.496	.523	.551	.580
N= 110	.123	.148	.174	.199	.225	.250	.276	.302	.328	.354	.381	.407	.434	.461	.489	.517	.545	.573
N= 120	.118	.143	.168	.194	.219	.245	.271	.297	.323	.349	.375	.402	.429	.456	.483	.511	.539	.567
N= 130	.113	.138	.164	.189	.214	.240	.266	.292	.318	.344	.370	.397	.424	.451	.478	.506	.534	.562
N= 140	.109	.134	.159	.185	.210	.236	.262	.287	.313	.340	.366	.392	.419	.446	.473	.501	.529	.557
N= 150	.105	.130	.156	.181	.206	.232	.258	.284	.309	.336	.362	.388	.415	.442	.469	.497	.525	.553
N= 160	.102	.127	.152	.178	.203	.229	.254	.280	.306	.332	.358	.385	.412	.439	.466	.493	.521	.549
N= 170	.099	.124	.149	.175	.200	.225	.251	.277	.303	.329	.355	.382	.408	.435	.463	.490	.518	.546
N= 180	.096	.121	.146	.172	.197	.223	.248	.274	.300	.326	.352	.379	.405	.432	.460	.487	.515	.543
N= 190	.093	.118	.144	.169	.195	.220	.246	.271	.297	.323	.350	.376	.403	.430	.457	.484	.512	.540
N= 200	.091	.116	.141	.167	.192	.218	.243	.269	.295	.321	.347	.373	.400	.427	.454	.482	.509	.537
N= 250	.081	.106	.132	.157	.182	.208	.233	.259	.285	.311	.337	.363	.390	.417	.444	.471	.499	.527
N= 300	.074	.099	.125	.150	.175	.201	.226	.252	.277	.303	.330	.356	.382	.409	.436	.464	.491	.519
N= 400	.064	.089	.114	.140	.165	.190	.216	.241	.267	.293	.319	.345	.372	.399	.426	.453	.480	.508
N= 500	.057	.082	.108	.133	.158	.184	.209	.235	.260	.266	.312	.338	.365	.391	.418	.446	.473	.501
N= 600	.052	.077	.103	.128	.153	.178	.204	.229	.255	.281	.307	.333	.360	.386	.413	.440	.468	.496
N= 700	.048	.074	.099	.124	.149	.174	.200	.225	.251	.277	.303	.329	.356	.382	.409	.436	.464	.491
N= 800	.045	.070	.096	.121	.145	.171	.197	.222	.248	.274	.300	.326	.352	.379	.406	.433	.460	.488
N= 900	.043	.068	.093	.118	.143	.169	.194	.220	.245	.271	.297	.323	.350	.376	.403	.430	.457	.485
N= 1000	.041	.066	.091	.116	.141	.166	.192	.217	.243	.269	.295	.321	.347	.374	.401	.428	.455	.483
N= 9999	.013	.038	.063	.088	.113	.138	.164	.189	.215	.240	.266	.292	.319	.345	.372	.399	.426	.453
=50000	.006	.031	.056	.081	.106	.131	.157	.182	.208	.233	.259	.285	.311	.338	.364	.391	.418	.446

FACTORS OF CONFIDENCE INTERVALS FOR A NORMAL DISTRIBUTION

Proportion of Population Covered →

	.68	.69	.70	.71	.72	.73	.74	.75	.76	.77	.78	.79	.80	.81	.82	.83	.84	.85
N= 3	2.091	2.159	2.228	2.299	2.372	2.447	2.524	2.603	2.684	2.769	2.856	2.946	3.039	3.136	3.237	3.343	3.453	3.569
N= 4	1.590	1.641	1.693	1.746	1.800	1.856	1.913	1.972	2.033	2.095	2.159	2.226	2.295	2.366	2.441	2.518	2.599	2.684
N= 5	1.366	1.411	1.456	1.502	1.549	1.597	1.647	1.698	1.750	1.804	1.859	1.917	1.976	2.038	2.101	2.168	2.237	2.310
N= 6	1.235	1.276	1.317	1.360	1.403	1.448	1.493	1.540	1.588	1.637	1.688	1.740	1.795	1.851	1.909	1.970	2.033	2.100
N= 7	1.147	1.186	1.225	1.265	1.306	1.348	1.391	1.435	1.480	1.527	1.575	1.624	1.676	1.728	1.783	1.841	1.900	1.963
N= 8	1.083	1.120	1.158	1.197	1.236	1.276	1.318	1.360	1.403	1.448	1.494	1.541	1.590	1.641	1.693	1.748	1.805	1.865
N= 9	1.034	1.070	1.107	1.144	1.182	1.221	1.261	1.302	1.344	1.388	1.432	1.478	1.525	1.574	1.625	1.678	1.734	1.791
N= 10	.995	1.030	1.066	1.102	1.139	1.178	1.217	1.257	1.298	1.340	1.383	1.428	1.474	1.522	1.572	1.623	1.677	1.733
N= 11	.962	.997	1.032	1.068	1.104	1.142	1.180	1.219	1.260	1.301	1.343	1.387	1.432	1.479	1.528	1.578	1.631	1.686
N= 12	.935	.969	1.004	1.039	1.075	1.112	1.150	1.188	1.228	1.268	1.310	1.353	1.398	1.444	1.491	1.541	1.593	1.647
N= 13	.912	.945	.980	1.014	1.050	1.086	1.123	1.162	1.201	1.241	1.282	1.324	1.368	1.414	1.461	1.509	1.560	1.614
N= 14	.892	.925	.959	.993	1.028	1.064	1.101	1.139	1.177	1.217	1.258	1.299	1.343	1.388	1.434	1.482	1.532	1.585
N= 15	.874	.907	.940	.974	1.009	1.045	1.081	1.119	1.157	1.196	1.236	1.278	1.321	1.365	1.411	1.458	1.508	1.560
N= 16	.858	.891	.924	.958	.992	1.028	1.064	1.101	1.139	1.177	1.217	1.258	1.301	1.345	1.390	1.438	1.487	1.538
N= 17	.844	.876	.909	.943	.977	1.012	1.048	1.085	1.122	1.161	1.201	1.241	1.283	1.327	1.372	1.419	1.468	1.519
N= 18	.831	.864	.896	.930	.964	.999	1.034	1.071	1.108	1.146	1.185	1.226	1.268	1.311	1.356	1.402	1.451	1.501
N= 19	.820	.852	.885	.918	.952	.986	1.021	1.058	1.095	1.133	1.172	1.212	1.254	1.296	1.341	1.387	1.435	1.485
N= 20	.809	.841	.874	.907	.940	.975	1.010	1.046	1.083	1.120	1.159	1.199	1.241	1.283	1.327	1.373	1.421	1.471
N= 21	.800	.831	.864	.897	.930	.964	.999	1.035	1.072	1.109	1.148	1.188	1.229	1.271	1.315	1.361	1.408	1.458
N= 22	.791	.822	.855	.887	.921	.956	.990	1.025	1.062	1.099	1.137	1.177	1.218	1.260	1.304	1.349	1.396	1.446
N= 23	.783	.814	.846	.879	.912	.946	.981	1.016	1.052	1.090	1.128	1.167	1.208	1.250	1.293	1.338	1.385	1.435
N= 24	.775	.806	.838	.871	.904	.938	.972	1.007	1.044	1.081	1.119	1.158	1.198	1.240	1.284	1.329	1.375	1.424
N= 25	.768	.799	.831	.863	.896	.930	.964	1.000	1.036	1.072	1.110	1.150	1.190	1.231	1.275	1.319	1.366	1.415
N= 26	.761	.792	.824	.856	.889	.923	.957	.992	1.028	1.065	1.103	1.142	1.182	1.223	1.266	1.311	1.357	1.406
N= 27	.755	.786	.818	.850	.883	.916	.950	.985	1.021	1.058	1.095	1.134	1.174	1.216	1.258	1.303	1.349	1.397
N= 28	.749	.780	.812	.844	.876	.910	.944	.979	1.014	1.051	1.089	1.127	1.167	1.208	1.251	1.295	1.341	1.390
N= 29	.744	.775	.806	.838	.871	.904	.938	.973	1.008	1.045	1.082	1.121	1.160	1.202	1.244	1.288	1.334	1.382
N= 30	.738	.769	.801	.832	.865	.898	.932	.967	1.002	1.039	1.076	1.114	1.154	1.195	1.238	1.282	1.327	1.375
N= 31	.733	.764	.795	.827	.860	.893	.927	.961	.997	1.033	1.070	1.109	1.148	1.189	1.231	1.275	1.321	1.369
N= 32	.729	.759	.791	.822	.855	.888	.922	.956	.991	1.028	1.065	1.103	1.143	1.183	1.226	1.269	1.315	1.363
N= 33	.724	.755	.786	.818	.850	.883	.917	.951	.986	1.023	1.060	1.098	1.137	1.178	1.220	1.264	1.309	1.357
N= 34	.720	.751	.782	.813	.846	.879	.912	.946	.982	1.018	1.055	1.093	1.132	1.173	1.215	1.258	1.304	1.351
N= 35	.716	.747	.778	.809	.841	.874	.908	.942	.977	1.013	1.050	1.088	1.127	1.168	1.210	1.253	1.299	1.346
N= 36	.712	.743	.774	.805	.837	.870	.904	.938	.973	1.009	1.046	1.084	1.123	1.163	1.205	1.248	1.294	1.341
N= 37	.708	.739	.770	.801	.833	.866	.900	.934	.969	1.005	1.041	1.079	1.118	1.159	1.200	1.244	1.289	1.336
N= 38	.705	.735	.766	.798	.830	.862	.896	.930	.965	1.001	1.037	1.075	1.114	1.154	1.196	1.239	1.284	1.331
N= 39	.702	.732	.763	.794	.826	.859	.892	.926	.961	.997	1.033	1.071	1.110	1.150	1.192	1.235	1.280	1.327
N= 40	.698	.729	.759	.791	.823	.855	.889	.923	.957	.993	1.030	1.067	1.106	1.146	1.188	1.231	1.276	1.323
N= 41	.695	.726	.756	.788	.819	.852	.885	.919	.954	.990	1.026	1.064	1.103	1.143	1.184	1.227	1.272	1.319
N= 42	.692	.722	.753	.784	.816	.849	.882	.916	.951	.986	1.023	1.060	1.099	1.139	1.180	1.223	1.268	1.315
N= 43	.689	.720	.750	.782	.813	.846	.879	.913	.947	.983	1.019	1.057	1.096	1.136	1.177	1.220	1.264	1.311
N= 44	.687	.717	.747	.779	.810	.843	.876	.910	.944	.980	1.016	1.054	1.092	1.132	1.173	1.216	1.261	1.307
N= 45	.684	.714	.745	.776	.808	.840	.873	.907	.941	.977	1.013	1.051	1.089	1.129	1.170	1.213	1.257	1.304
N= 46	.681	.711	.742	.773	.805	.837	.870	.904	.938	.974	1.010	1.048	1.086	1.126	1.167	1.210	1.254	1.301
N= 47	.679	.709	.740	.771	.802	.835	.868	.901	.936	.971	1.007	1.045	1.083	1.123	1.164	1.207	1.251	1.297
N= 48	.676	.707	.737	.768	.800	.832	.865	.899	.933	.968	1.005	1.042	1.080	1.120	1.161	1.204	1.248	1.294
N= 49	.674	.704	.735	.766	.797	.830	.862	.896	.930	.966	1.002	1.039	1.078	1.117	1.158	1.201	1.245	1.291
N= 50	.672	.702	.732	.763	.795	.827	.860	.894	.928	.963	.999	1.037	1.075	1.114	1.155	1.198	1.242	1.288
N= 55	.662	.692	.722	.753	.784	.816	.849	.882	.917	.952	.988	1.025	1.063	1.102	1.143	1.185	1.229	1.275
N= 60	.653	.683	.713	.744	.775	.807	.839	.873	.907	.942	.978	1.014	1.052	1.092	1.132	1.174	1.218	1.264
N= 65	.645	.675	.705	.735	.767	.799	.831	.864	.898	.933	.969	1.005	1.043	1.082	1.123	1.165	1.208	1.254
N= 70	.638	.668	.698	.728	.760	.791	.824	.857	.891	.925	.961	.998	1.035	1.074	1.114	1.156	1.200	1.245
N= 75	.632	.661	.692	.722	.753	.785	.817	.850	.884	.918	.954	.990	1.028	1.067	1.107	1.149	1.192	1.237
N= 80	.626	.656	.686	.716	.747	.779	.811	.844	.878	.912	.948	.984	1.022	1.060	1.100	1.142	1.185	1.230
N= 85	.621	.651	.681	.711	.742	.774	.806	.839	.872	.907	.942	.978	1.016	1.054	1.094	1.136	1.179	1.224

N=	13	.912	.945	.980	1.014	1.050	1.086	1.123	1.162	1.201	1.241	1.282	1.324	1.368	1.414	1.461	1.509	1.560	1.614
N=	14	.892	.925	.959	.993	1.028	1.064	1.101	1.139	1.177	1.217	1.258	1.299	1.343	1.388	1.434	1.482	1.532	1.585
N=	15	.874	.907	.940	.974	1.009	1.045	1.081	1.119	1.157	1.196	1.236	1.278	1.321	1.365	1.411	1.458	1.508	1.560
N=	16	.858	.891	.924	.958	.992	1.028	1.064	1.101	1.139	1.177	1.217	1.258	1.301	1.345	1.390	1.438	1.487	1.538
N=	17	.844	.876	.909	.943	.977	1.012	1.048	1.085	1.122	1.161	1.201	1.241	1.283	1.327	1.372	1.419	1.468	1.519
N=	18	.831	.864	.896	.930	.964	.999	1.034	1.071	1.108	1.146	1.185	1.226	1.268	1.311	1.356	1.402	1.451	1.501
N=	19	.820	.852	.885	.918	.952	.986	1.021	1.058	1.095	1.133	1.172	1.212	1.254	1.296	1.341	1.387	1.435	1.485
N=	20	.809	.841	.874	.907	.940	.975	1.010	1.046	1.083	1.120	1.159	1.199	1.241	1.283	1.327	1.373	1.421	1.471
N=	21	.800	.831	.864	.897	.930	.964	.999	1.035	1.072	1.109	1.148	1.188	1.229	1.271	1.315	1.361	1.408	1.458
N=	22	.791	.822	.855	.887	.921	.955	.990	1.025	1.062	1.099	1.137	1.177	1.218	1.260	1.304	1.349	1.396	1.446
N=	23	.783	.814	.846	.879	.912	.946	.981	1.016	1.052	1.090	1.128	1.167	1.208	1.250	1.293	1.338	1.385	1.435
N=	24	.775	.806	.838	.871	.904	.938	.972	1.007	1.044	1.081	1.119	1.158	1.198	1.240	1.284	1.329	1.375	1.424
N=	25	.768	.799	.831	.863	.896	.930	.964	1.000	1.036	1.072	1.110	1.150	1.190	1.231	1.275	1.319	1.366	1.415
N=	26	.761	.792	.824	.856	.889	.923	.957	.992	1.028	1.065	1.103	1.142	1.182	1.223	1.266	1.311	1.357	1.406
N=	27	.755	.786	.818	.850	.883	.916	.950	.985	1.021	1.058	1.095	1.134	1.174	1.216	1.258	1.303	1.349	1.397
N=	28	.749	.780	.812	.844	.876	.910	.944	.979	1.014	1.051	1.089	1.127	1.167	1.208	1.251	1.295	1.341	1.390
N=	29	.744	.775	.806	.838	.871	.904	.938	.973	1.008	1.045	1.082	1.121	1.160	1.202	1.244	1.288	1.334	1.382
N=	30	.738	.769	.801	.832	.865	.898	.932	.967	1.002	1.039	1.076	1.114	1.154	1.195	1.238	1.282	1.327	1.375
N=	31	.733	.764	.795	.827	.860	.893	.927	.961	.997	1.033	1.070	1.109	1.148	1.189	1.231	1.275	1.321	1.369
N=	32	.729	.759	.791	.822	.855	.888	.922	.956	.991	1.028	1.065	1.103	1.143	1.183	1.226	1.269	1.315	1.363
N=	33	.724	.755	.786	.818	.850	.883	.917	.951	.986	1.023	1.060	1.098	1.137	1.178	1.220	1.264	1.309	1.357
N=	34	.720	.751	.782	.813	.846	.879	.912	.946	.982	1.018	1.055	1.093	1.132	1.173	1.215	1.258	1.304	1.351
N=	35	.716	.747	.778	.809	.841	.874	.908	.942	.977	1.013	1.050	1.088	1.127	1.168	1.210	1.253	1.299	1.346
N=	36	.712	.743	.774	.805	.837	.870	.904	.938	.973	1.009	1.046	1.084	1.123	1.163	1.205	1.248	1.294	1.341
N=	37	.708	.739	.770	.801	.833	.866	.900	.934	.969	1.005	1.041	1.079	1.118	1.159	1.200	1.244	1.289	1.336
N=	38	.705	.735	.766	.798	.830	.862	.896	.930	.965	1.001	1.037	1.075	1.114	1.154	1.196	1.239	1.284	1.331
N=	39	.702	.732	.763	.794	.826	.859	.892	.926	.961	.997	1.033	1.071	1.110	1.150	1.192	1.235	1.280	1.327
N=	40	.698	.729	.759	.791	.823	.855	.889	.923	.957	.993	1.030	1.067	1.106	1.146	1.188	1.231	1.276	1.323
N=	41	.695	.726	.756	.788	.819	.852	.885	.919	.954	.990	1.026	1.064	1.103	1.143	1.184	1.227	1.272	1.319
N=	42	.692	.722	.753	.784	.816	.849	.882	.916	.951	.986	1.023	1.060	1.099	1.139	1.180	1.223	1.268	1.315
N=	43	.689	.720	.750	.782	.813	.846	.879	.913	.947	.983	1.019	1.057	1.096	1.136	1.177	1.220	1.264	1.311
N=	44	.687	.717	.747	.779	.810	.843	.876	.910	.944	.980	1.016	1.054	1.092	1.132	1.173	1.216	1.261	1.307
N=	45	.684	.714	.745	.776	.808	.840	.873	.907	.941	.977	1.013	1.051	1.089	1.129	1.170	1.213	1.257	1.304
N=	46	.681	.711	.742	.773	.805	.837	.870	.904	.938	.974	1.010	1.048	1.086	1.126	1.167	1.210	1.254	1.301
N=	47	.679	.709	.740	.771	.802	.835	.868	.901	.936	.971	1.007	1.045	1.083	1.123	1.164	1.207	1.251	1.297
N=	48	.676	.707	.737	.768	.800	.832	.865	.899	.933	.968	1.005	1.042	1.080	1.120	1.161	1.204	1.248	1.294
N=	49	.674	.704	.735	.766	.797	.830	.862	.896	.930	.966	1.002	1.039	1.078	1.117	1.158	1.201	1.245	1.291
N=	50	.672	.702	.732	.763	.795	.827	.860	.894	.928	.963	.999	1.037	1.075	1.114	1.155	1.198	1.242	1.288
N=	55	.662	.692	.722	.753	.784	.816	.849	.882	.917	.952	.988	1.025	1.063	1.102	1.143	1.185	1.229	1.275
N=	60	.653	.683	.713	.742	.775	.807	.839	.873	.907	.942	.978	1.014	1.052	1.092	1.132	1.174	1.218	1.264
N=	65	.645	.675	.705	.735	.767	.799	.831	.864	.898	.933	.969	1.005	1.043	1.082	1.123	1.165	1.208	1.254
N=	70	.638	.668	.698	.728	.760	.791	.824	.857	.891	.925	.961	.998	1.035	1.074	1.114	1.156	1.200	1.245
N=	75	.632	.661	.692	.722	.753	.785	.817	.850	.884	.918	.954	.990	1.028	1.067	1.107	1.149	1.192	1.237
N=	80	.626	.656	.686	.716	.747	.779	.811	.844	.878	.912	.948	.984	1.022	1.060	1.100	1.142	1.185	1.230
N=	85	.621	.651	.681	.711	.742	.774	.806	.839	.872	.907	.942	.978	1.016	1.054	1.094	1.136	1.179	1.224
N=	90	.617	.646	.676	.706	.737	.769	.801	.834	.867	.902	.937	.973	1.010	1.049	1.089	1.130	1.173	1.218
N=	95	.613	.642	.672	.702	.733	.764	.796	.829	.863	.897	.932	.968	1.006	1.044	1.084	1.125	1.168	1.213
N=	100	.609	.638	.668	.698	.729	.760	.792	.825	.858	.893	.928	.964	1.001	1.040	1.079	1.120	1.163	1.208
N=	110	.602	.631	.661	.691	.722	.753	.785	.817	.851	.885	.920	.956	.993	1.031	1.071	1.112	1.155	1.199
N=	120	.596	.625	.655	.685	.715	.747	.779	.811	.844	.878	.913	.949	.986	1.024	1.064	1.105	1.147	1.192
N=	130	.591	.620	.649	.679	.710	.741	.773	.805	.839	.873	.907	.943	.980	1.018	1.058	1.099	1.141	1.185
N=	140	.586	.615	.645	.675	.705	.736	.768	.800	.833	.867	.902	.938	.975	1.013	1.052	1.093	1.135	1.180
N=	150	.582	.611	.640	.670	.701	.732	.764	.796	.829	.863	.898	.933	.970	1.008	1.047	1.088	1.130	1.174
N=	160	.578	.607	.636	.666	.697	.728	.760	.792	.825	.859	.893	.929	.966	1.004	1.043	1.083	1.126	1.170
N=	170	.575	.604	.633	.663	.693	.724	.756	.788	.821	.855	.890	.925	.962	1.000	1.039	1.079	1.121	1.165
N=	180	.571	.600	.630	.660	.690	.721	.753	.785	.818	.851	.886	.922	.958	.996	1.035	1.076	1.118	1.162
N=	190	.569	.598	.627	.657	.687	.718	.750	.782	.815	.848	.883	.918	.955	.993	1.032	1.072	1.114	1.158
N=	200	.566	.595	.624	.654	.684	.715	.747	.779	.812	.845	.880	.915	.952	.990	1.029	1.069	1.111	1.155
N=	250	.555	.584	.613	.643	.673	.704	.735	.767	.800	.834	.868	.903	.940	.977	1.016	1.056	1.098	1.142
N=	300	.547	.576	.605	.635	.665	.696	.727	.759	.792	.825	.859	.895	.931	.968	1.007	1.047	1.089	1.132
N=	400	.537	.565	.594	.624	.654	.684	.716	.747	.780	.813	.847	.882	.919	.956	.994	1.034	1.076	1.119
N=	500	.529	.558	.587	.616	.646	.677	.708	.739	.772	.805	.839	.874	.910	.947	.986	1.025	1.067	1.110
N=	600	.524	.552	.581	.611	.640	.671	.702	.734	.766	.799	.833	.868	.904	.941	.979	1.019	1.060	1.103
N=	700	.519	.548	.577	.606	.636	.667	.698	.729	.762	.795	.829	.863	.899	.936	.974	1.014	1.055	1.098
N=	800	.516	.545	.573	.603	.633	.663	.694	.726	.758	.791	.825	.860	.895	.932	.971	1.010	1.051	1.094
N=	900	.513	.542	.571	.600	.630	.660	.691	.723	.755	.788	.822	.857	.892	.929	.967	1.007	1.048	1.091
N=	1000	.511	.539	.568	.597	.627	.658	.689	.720	.752	.785	.819	.854	.890	.927	.965	1.004	1.045	1.088
N=	9999	.481	.509	.538	.567	.597	.627	.657	.689	.721	.753	.787	.821	.857	.893	.931	.970	1.010	1.052
N=	50000	.474	.502	.530	.559	.589	.619	.650	.681	.713	.745	.779	.813	.848	.885	.922	.961	1.001	1.044

TABLE I (Cont.)

FACTORS OF ONE-SIDED TOLERANCE LIMITS FOR A NORMAL DISTRIBUTION

90% CONFIDENCE

Proportion of Population Covered →	.86	.87	.88	.89	.90	.91	.92	.93	.94	.95	.96	.97	.98	.99	.995	.999
N= 3	3.690	3.819	3.954	4.102	4.258	4.428	4.613	4.818	5.048	5.311	5.623	6.008	6.523	7.340	8.092	9.651
N= 4	2.773	2.867	2.966	3.073	3.188	3.312	3.447	3.596	3.764	3.957	4.184	4.465	4.841	5.438	5.988	7.129
N= 5	2.387	2.467	2.552	2.644	2.742	2.848	2.964	3.092	3.235	3.400	3.594	3.834	4.156	4.666	5.136	6.111
N= 6	2.170	2.243	2.320	2.404	2.494	2.590	2.695	2.812	2.942	3.092	3.269	3.487	3.779	4.242	4.669	5.555
N= 7	2.028	2.097	2.170	2.249	2.333	2.423	2.522	2.631	2.753	2.894	3.059	3.264	3.538	3.972	4.372	5.202
N= 8	1.928	1.994	2.063	2.139	2.219	2.305	2.399	2.503	2.620	2.754	2.912	3.108	3.368	3.782	4.164	4.955
N= 9	1.852	1.916	1.983	2.056	2.133	2.216	2.307	2.408	2.521	2.650	2.802	2.991	3.242	3.641	4.009	4.771
N= 10	1.792	1.854	1.920	1.990	2.066	2.147	2.235	2.333	2.443	2.568	2.716	2.899	3.144	3.532	3.888	4.628
N= 11	1.744	1.805	1.868	1.938	2.011	2.090	2.177	2.273	2.380	2.502	2.647	2.826	3.065	3.443	3.791	4.514
N= 12	1.703	1.763	1.826	1.894	1.966	2.044	2.129	2.222	2.328	2.448	2.590	2.765	2.999	3.370	3.712	4.419
N= 13	1.669	1.728	1.790	1.857	1.928	2.004	2.088	2.180	2.284	2.402	2.542	2.714	2.944	3.309	3.645	4.340
N= 14	1.640	1.698	1.759	1.825	1.895	1.971	2.053	2.144	2.246	2.363	2.500	2.670	2.897	3.257	3.587	4.273
N= 15	1.615	1.672	1.732	1.797	1.867	1.941	2.023	2.113	2.213	2.329	2.465	2.633	2.857	3.212	3.538	4.215
N= 16	1.592	1.649	1.709	1.773	1.842	1.916	1.996	2.085	2.185	2.299	2.433	2.599	2.821	3.172	3.495	4.164
N= 17	1.572	1.629	1.688	1.752	1.819	1.893	1.973	2.061	2.159	2.272	2.406	2.570	2.789	3.137	3.456	4.118
N= 18	1.554	1.610	1.669	1.732	1.799	1.872	1.951	2.039	2.137	2.249	2.381	2.543	2.761	3.105	3.422	4.078
N= 19	1.538	1.593	1.652	1.715	1.781	1.854	1.932	2.019	2.116	2.227	2.358	2.520	2.735	3.077	3.391	4.042
N= 20	1.523	1.578	1.636	1.699	1.765	1.837	1.915	2.001	2.097	2.208	2.338	2.498	2.712	3.051	3.363	4.009
N= 21	1.510	1.565	1.622	1.684	1.750	1.821	1.899	1.984	2.080	2.190	2.319	2.479	2.691	3.028	3.338	3.979
N= 22	1.497	1.552	1.609	1.671	1.736	1.807	1.884	1.969	2.065	2.174	2.302	2.461	2.672	3.007	3.314	3.951
N= 23	1.486	1.540	1.597	1.659	1.724	1.794	1.871	1.956	2.050	2.159	2.286	2.444	2.654	2.987	3.293	3.926
N= 24	1.476	1.530	1.586	1.647	1.712	1.782	1.859	1.943	2.037	2.145	2.272	2.429	2.638	2.969	3.273	3.903
N= 25	1.466	1.519	1.576	1.637	1.701	1.771	1.847	1.931	2.025	2.132	2.259	2.415	2.623	2.952	3.255	3.882
N= 26	1.457	1.510	1.566	1.627	1.691	1.761	1.836	1.920	2.013	2.120	2.246	2.401	2.609	2.937	3.238	3.862
N= 27	1.448	1.501	1.557	1.618	1.682	1.751	1.826	1.910	2.003	2.109	2.235	2.389	2.595	2.922	3.222	3.843
N= 28	1.440	1.493	1.549	1.609	1.673	1.742	1.817	1.900	1.993	2.099	2.224	2.378	2.583	2.908	3.207	3.826
N= 29	1.433	1.486	1.541	1.601	1.665	1.734	1.808	1.891	1.983	2.089	2.213	2.367	2.572	2.896	3.193	3.809
N= 30	1.425	1.478	1.534	1.593	1.657	1.725	1.800	1.882	1.974	2.080	2.204	2.357	2.561	2.884	3.180	3.794
N= 31	1.419	1.471	1.527	1.586	1.650	1.718	1.792	1.874	1.966	2.071	2.195	2.347	2.550	2.872	3.168	3.780
N= 32	1.412	1.465	1.520	1.579	1.643	1.711	1.785	1.867	1.958	2.063	2.186	2.338	2.541	2.862	3.156	3.766
N= 33	1.406	1.459	1.514	1.573	1.636	1.704	1.778	1.859	1.951	2.055	2.178	2.330	2.532	2.851	3.145	3.753
N= 34	1.401	1.453	1.508	1.567	1.630	1.698	1.771	1.853	1.944	2.048	2.170	2.321	2.523	2.842	3.135	3.741
N= 35	1.395	1.447	1.502	1.561	1.624	1.691	1.765	1.846	1.937	2.041	2.163	2.314	2.515	2.833	3.125	3.729
N= 36	1.390	1.442	1.497	1.556	1.618	1.686	1.759	1.840	1.930	2.034	2.156	2.306	2.507	2.824	3.115	3.718
N= 37	1.385	1.437	1.491	1.550	1.613	1.680	1.753	1.834	1.924	2.028	2.149	2.299	2.499	2.816	3.106	3.708
N= 38	1.381	1.432	1.487	1.545	1.608	1.675	1.748	1.828	1.918	2.022	2.143	2.293	2.492	2.808	3.098	3.698
N= 39	1.376	1.428	1.482	1.540	1.603	1.670	1.743	1.823	1.913	2.016	2.137	2.286	2.485	2.800	3.090	3.688
N= 40	1.372	1.423	1.477	1.536	1.598	1.665	1.738	1.818	1.908	2.010	2.131	2.280	2.479	2.793	3.082	3.679
N= 41	1.368	1.419	1.473	1.531	1.593	1.660	1.733	1.813	1.902	2.005	2.126	2.274	2.473	2.786	3.074	3.670
N= 42	1.364	1.415	1.469	1.527	1.589	1.656	1.728	1.808	1.897	2.000	2.120	2.269	2.467	2.780	3.067	3.662
N= 43	1.360	1.411	1.465	1.523	1.585	1.651	1.724	1.803	1.893	1.995	2.115	2.263	2.461	2.773	3.060	3.653
N= 44	1.356	1.407	1.461	1.519	1.581	1.647	1.719	1.799	1.888	1.990	2.110	2.258	2.455	2.767	3.053	3.646
N= 45	1.353	1.404	1.457	1.515	1.577	1.643	1.715	1.795	1.884	1.986	2.105	2.253	2.450	2.761	3.047	3.638
N= 46	1.349	1.400	1.454	1.512	1.573	1.639	1.711	1.791	1.880	1.981	2.101	2.248	2.445	2.756	3.041	3.631
N= 47	1.346	1.397	1.450	1.508	1.569	1.636	1.708	1.787	1.876	1.977	2.096	2.244	2.440	2.750	3.035	3.624
N= 48	1.343	1.394	1.447	1.505	1.566	1.632	1.704	1.783	1.872	1.973	2.092	2.239	2.435	2.745	3.029	3.617
N= 49	1.340	1.391	1.444	1.502	1.563	1.629	1.700	1.779	1.868	1.969	2.088	2.235	2.430	2.740	3.024	3.611
N= 50	1.337	1.388	1.441	1.498	1.559	1.625	1.697	1.776	1.864	1.965	2.084	2.231	2.426	2.735	3.018	3.605
N= 55	1.323	1.374	1.427	1.484	1.545	1.610	1.681	1.760	1.848	1.948	2.066	2.212	2.406	2.713	2.994	3.576
N= 60	1.312	1.362	1.415	1.472	1.532	1.597	1.668	1.746	1.833	1.933	2.051	2.195	2.388	2.693	2.973	3.552
N= 65	1.301	1.352	1.404	1.461	1.521	1.586	1.656	1.734	1.821	1.920	2.037	2.181	2.373	2.677	2.955	3.531
N= 70	1.293	1.342	1.395	1.451	1.511	1.576	1.646	1.723	1.810	1.909	2.025	2.169	2.360	2.662	2.939	3.513
N= 75	1.285	1.334	1.386	1.443	1.502	1.567	1.637	1.714	1.800	1.899	2.015	2.158	2.348	2.649	2.925	3.496
N= 80	1.277	1.327	1.379	1.435	1.495	1.559	1.629	1.706	1.792	1.890	2.005	2.148	2.338	2.638	2.913	3.481

N=	14	1.640	1.698	1.759	1.825	1.895	1.971	2.053	2.144	2.246	2.363	2.500	2.670	2.897	3.257	3.587	4.273
N=	15	1.615	1.672	1.732	1.797	1.867	1.941	2.023	2.113	2.213	2.329	2.465	2.633	2.857	3.212	3.538	4.215
N=	16	1.592	1.649	1.709	1.773	1.842	1.916	1.996	2.085	2.185	2.299	2.433	2.599	2.821	3.172	3.495	4.164
N=	17	1.572	1.629	1.688	1.752	1.819	1.893	1.973	2.061	2.159	2.272	2.406	2.570	2.789	3.137	3.456	4.118
N=	18	1.554	1.610	1.669	1.732	1.799	1.872	1.951	2.039	2.137	2.249	2.381	2.543	2.761	3.105	3.422	4.078
N=	19	1.538	1.593	1.652	1.715	1.781	1.854	1.932	2.019	2.116	2.227	2.358	2.520	2.735	3.077	3.391	4.042
N=	20	1.523	1.578	1.636	1.699	1.765	1.837	1.915	2.001	2.097	2.208	2.338	2.498	2.712	3.051	3.363	4.009
N=	21	1.510	1.565	1.622	1.684	1.750	1.821	1.899	1.984	2.080	2.190	2.319	2.479	2.691	3.028	3.338	3.979
N=	22	1.497	1.552	1.609	1.671	1.736	1.807	1.884	1.969	2.065	2.174	2.302	2.461	2.672	3.007	3.314	3.951
N=	23	1.486	1.540	1.597	1.659	1.724	1.794	1.871	1.956	2.050	2.159	2.286	2.444	2.654	2.987	3.293	3.926
N=	24	1.476	1.530	1.586	1.647	1.712	1.782	1.859	1.943	2.037	2.145	2.272	2.429	2.638	2.969	3.273	3.903
N=	25	1.466	1.519	1.576	1.637	1.701	1.771	1.847	1.931	2.025	2.132	2.259	2.415	2.623	2.952	3.255	3.882
N=	26	1.457	1.510	1.566	1.627	1.691	1.761	1.836	1.920	2.013	2.120	2.246	2.401	2.609	2.937	3.238	3.862
N=	27	1.448	1.501	1.557	1.618	1.682	1.751	1.826	1.910	2.003	2.109	2.235	2.389	2.595	2.922	3.222	3.843
N=	28	1.440	1.493	1.549	1.609	1.673	1.742	1.817	1.900	1.993	2.099	2.224	2.378	2.583	2.908	3.207	3.826
N=	29	1.433	1.486	1.541	1.601	1.665	1.734	1.808	1.891	1.983	2.089	2.213	2.367	2.572	2.896	3.193	3.809
N=	30	1.425	1.478	1.534	1.593	1.657	1.725	1.800	1.882	1.974	2.080	2.204	2.357	2.561	2.884	3.180	3.794
N=	31	1.419	1.471	1.527	1.586	1.650	1.718	1.792	1.874	1.966	2.071	2.195	2.347	2.550	2.872	3.168	3.780
N=	32	1.412	1.465	1.520	1.579	1.643	1.711	1.785	1.867	1.958	2.063	2.186	2.338	2.541	2.862	3.156	3.766
N=	33	1.406	1.459	1.514	1.573	1.636	1.704	1.778	1.859	1.951	2.055	2.178	2.330	2.532	2.851	3.145	3.753
N=	34	1.401	1.453	1.508	1.567	1.630	1.698	1.771	1.853	1.944	2.048	2.170	2.321	2.523	2.842	3.135	3.741
N=	35	1.395	1.447	1.502	1.561	1.624	1.691	1.765	1.846	1.937	2.041	2.163	2.314	2.515	2.833	3.125	3.729
N=	36	1.390	1.442	1.497	1.556	1.618	1.686	1.759	1.840	1.930	2.034	2.156	2.306	2.507	2.824	3.115	3.718
N=	37	1.385	1.437	1.491	1.550	1.613	1.680	1.753	1.834	1.924	2.028	2.149	2.299	2.499	2.816	3.106	3.708
N=	38	1.381	1.432	1.487	1.545	1.608	1.675	1.748	1.828	1.918	2.022	2.143	2.293	2.492	2.808	3.098	3.698
N=	39	1.376	1.428	1.482	1.540	1.603	1.670	1.743	1.823	1.913	2.016	2.137	2.286	2.485	2.800	3.090	3.688
N=	40	1.372	1.423	1.477	1.536	1.598	1.665	1.738	1.818	1.908	2.010	2.131	2.280	2.479	2.793	3.082	3.679
N=	41	1.368	1.419	1.473	1.531	1.593	1.660	1.733	1.813	1.902	2.005	2.126	2.274	2.473	2.786	3.074	3.670
N=	42	1.364	1.415	1.469	1.527	1.589	1.656	1.728	1.808	1.897	2.000	2.120	2.269	2.467	2.780	3.067	3.662
N=	43	1.360	1.411	1.465	1.523	1.585	1.651	1.724	1.803	1.893	1.995	2.115	2.263	2.461	2.773	3.060	3.653
N=	44	1.356	1.407	1.461	1.519	1.581	1.647	1.719	1.799	1.888	1.990	2.110	2.258	2.455	2.767	3.053	3.646
N=	45	1.353	1.404	1.457	1.515	1.577	1.643	1.715	1.795	1.884	1.986	2.105	2.253	2.450	2.761	3.047	3.638
N=	46	1.349	1.400	1.454	1.512	1.573	1.639	1.711	1.791	1.880	1.981	2.101	2.248	2.445	2.756	3.041	3.631
N=	47	1.346	1.397	1.450	1.508	1.569	1.636	1.708	1.787	1.876	1.977	2.096	2.244	2.440	2.750	3.035	3.624
N=	48	1.343	1.394	1.447	1.505	1.566	1.632	1.704	1.783	1.872	1.973	2.092	2.239	2.435	2.745	3.029	3.617
N=	49	1.340	1.391	1.444	1.502	1.563	1.629	1.700	1.779	1.868	1.969	2.088	2.235	2.430	2.740	3.024	3.611
N=	50	1.337	1.388	1.441	1.498	1.559	1.625	1.697	1.776	1.864	1.965	2.084	2.231	2.426	2.735	3.018	3.605
N=	55	1.323	1.374	1.427	1.484	1.545	1.610	1.681	1.760	1.848	1.948	2.066	2.212	2.406	2.713	2.994	3.576
N=	60	1.312	1.362	1.415	1.472	1.532	1.597	1.668	1.746	1.833	1.933	2.051	2.195	2.388	2.693	2.973	3.552
N=	65	1.301	1.352	1.404	1.461	1.521	1.586	1.656	1.734	1.821	1.920	2.037	2.181	2.373	2.677	2.955	3.531
N=	70	1.293	1.343	1.395	1.451	1.511	1.576	1.646	1.723	1.810	1.909	2.025	2.169	2.360	2.662	2.939	3.513
N=	75	1.285	1.334	1.386	1.443	1.502	1.567	1.637	1.714	1.800	1.899	2.015	2.158	2.348	2.649	2.925	3.496
N=	80	1.277	1.327	1.379	1.435	1.495	1.559	1.629	1.706	1.792	1.890	2.005	2.148	2.338	2.638	2.913	3.481
N=	85	1.271	1.320	1.372	1.428	1.488	1.552	1.621	1.698	1.784	1.882	1.997	2.139	2.328	2.627	2.901	3.468
N=	90	1.265	1.314	1.366	1.422	1.481	1.545	1.614	1.691	1.776	1.874	1.989	2.131	2.319	2.618	2.891	3.456
N=	95	1.260	1.309	1.360	1.416	1.475	1.539	1.608	1.685	1.770	1.867	1.982	2.123	2.312	2.609	2.881	3.445
N=	100	1.255	1.304	1.355	1.411	1.470	1.534	1.603	1.679	1.764	1.861	1.976	2.117	2.304	2.601	2.873	3.435
N=	110	1.246	1.295	1.346	1.402	1.460	1.524	1.593	1.668	1.753	1.850	1.964	2.104	2.291	2.587	2.857	3.417
N=	120	1.238	1.287	1.338	1.394	1.452	1.515	1.584	1.659	1.744	1.841	1.954	2.094	2.280	2.574	2.844	3.402
N=	130	1.232	1.280	1.331	1.387	1.445	1.508	1.576	1.652	1.736	1.832	1.945	2.085	2.270	2.564	2.833	3.388
N=	140	1.226	1.274	1.325	1.380	1.439	1.501	1.570	1.645	1.729	1.825	1.938	2.077	2.262	2.554	2.822	3.376
N=	150	1.220	1.269	1.320	1.375	1.433	1.495	1.564	1.639	1.722	1.818	1.931	2.069	2.254	2.546	2.813	3.365
N=	160	1.216	1.264	1.315	1.370	1.428	1.490	1.558	1.633	1.717	1.812	1.925	2.063	2.247	2.538	2.805	3.356
N=	170	1.211	1.260	1.310	1.365	1.423	1.485	1.553	1.628	1.711	1.807	1.919	2.057	2.241	2.531	2.797	3.347
N=	180	1.208	1.256	1.306	1.361	1.419	1.481	1.549	1.623	1.707	1.802	1.914	2.052	2.235	2.525	2.791	3.339
N=	190	1.204	1.252	1.303	1.357	1.415	1.477	1.545	1.619	1.702	1.797	1.909	2.047	2.230	2.519	2.784	3.332
N=	200	1.201	1.249	1.299	1.354	1.411	1.473	1.541	1.615	1.698	1.793	1.905	2.042	2.225	2.514	2.779	3.326
N=	250	1.187	1.235	1.285	1.339	1.397	1.459	1.526	1.600	1.682	1.777	1.888	2.024	2.206	2.493	2.756	3.299
N=	300	1.177	1.225	1.275	1.329	1.386	1.448	1.515	1.588	1.671	1.764	1.875	2.011	2.192	2.477	2.739	3.279
N=	400	1.164	1.211	1.261	1.315	1.372	1.433	1.499	1.572	1.654	1.748	1.857	1.993	2.172	2.456	2.716	3.253
N=	500	1.155	1.202	1.252	1.305	1.362	1.423	1.489	1.562	1.643	1.736	1.846	1.980	2.159	2.442	2.700	3.235
N=	600	1.148	1.195	1.245	1.298	1.354	1.415	1.481	1.554	1.635	1.728	1.837	1.971	2.150	2.431	2.689	3.221
N=	700	1.143	1.190	1.239	1.293	1.349	1.410	1.475	1.548	1.629	1.722	1.830	1.964	2.142	2.423	2.680	3.211
N=	800	1.139	1.186	1.235	1.288	1.344	1.405	1.471	1.543	1.624	1.717	1.825	1.959	2.136	2.417	2.673	3.203
N=	900	1.135	1.182	1.231	1.285	1.341	1.401	1.467	1.539	1.620	1.712	1.821	1.954	2.131	2.411	2.668	3.196
N=	1000	1.132	1.179	1.228	1.281	1.338	1.398	1.464	1.536	1.617	1.709	1.817	1.950	2.127	2.407	2.663	3.191
N=	9999	1.097	1.143	1.191	1.244	1.299	1.359	1.423	1.494	1.574	1.665	1.771	1.902	2.076	2.351	2.603	3.121
N=	50000	1.088	1.134	1.182	1.234	1.289	1.349	1.413	1.484	1.563	1.654	1.760	1.890	2.064	2.337	2.588	3.104

TABLE II

FACTORS OF ONE-SIDED TOLERANCE LIMITS FOR A NORMAL DISTRIBUTION

95% CONFIDENCE

Proportion of Population Covered →

	.50	.51	.52	.53	.54	.55	.56	.57	.58	.59	.60	.61	.62	.63	.64	.65	.66	.67
N= 3	1.686	1.751	1.818	1.886	1.955	2.025	2.097	2.170	2.245	2.321	2.399	2.478	2.559	2.642	2.727	2.813	2.901	2.992
N= 4	1.177	1.223	1.270	1.317	1.366	1.415	1.464	1.515	1.566	1.619	1.672	1.726	1.781	1.838	1.895	1.953	2.013	2.074
N= 5	.953	.993	1.032	1.072	1.113	1.154	1.196	1.239	1.282	1.325	1.370	1.415	1.461	1.507	1.555	1.603	1.653	1.703
N= 6	.823	.858	.894	.931	.968	1.005	1.043	1.081	1.117	1.159	1.199	1.239	1.281	1.323	1.365	1.408	1.453	1.498
N= 7	.734	.768	.802	.836	.870	.905	.941	.977	1.013	1.049	1.087	1.124	1.163	1.202	1.241	1.282	1.323	1.364
N= 8	.670	.702	.734	.767	.800	.833	.867	.901	.936	.971	1.006	1.042	1.078	1.115	1.153	1.191	1.230	1.270
N= 9	.620	.651	.682	.714	.746	.778	.811	.843	.877	.910	.945	.979	1.014	1.050	1.086	1.123	1.160	1.198
N= 10	.580	.610	.640	.671	.702	.734	.765	.798	.830	.863	.896	.929	.964	.998	1.033	1.069	1.105	1.142
N= 11	.546	.576	.606	.636	.667	.697	.728	.760	.791	.823	.856	.889	.922	.956	.990	1.025	1.060	1.096
N= 12	.518	.548	.577	.607	.637	.667	.697	.728	.759	.791	.822	.855	.887	.920	.954	.988	1.023	1.058
N= 13	.494	.523	.552	.581	.611	.641	.671	.701	.732	.763	.794	.826	.858	.890	.923	.957	.991	1.026
N= 14	.473	.502	.531	.559	.589	.618	.648	.678	.708	.738	.769	.801	.832	.864	.897	.930	.964	.998
N= 15	.455	.483	.511	.540	.569	.598	.627	.657	.687	.717	.748	.779	.810	.842	.874	.907	.940	.973
N= 16	.438	.466	.494	.523	.552	.580	.609	.639	.668	.698	.729	.759	.790	.822	.854	.886	.919	.952
N= 17	.423	.451	.479	.507	.536	.565	.593	.622	.652	.682	.712	.742	.773	.804	.835	.867	.900	.933
N= 18	.410	.438	.466	.494	.522	.550	.579	.608	.637	.666	.696	.726	.757	.788	.819	.851	.883	.916
N= 19	.398	.425	.453	.481	.509	.537	.566	.594	.623	.653	.682	.712	.742	.773	.804	.836	.867	.900
N= 20	.387	.414	.442	.469	.497	.525	.554	.582	.611	.640	.669	.699	.729	.760	.791	.822	.854	.886
N= 21	.376	.404	.431	.459	.486	.514	.543	.571	.600	.629	.658	.687	.717	.747	.778	.809	.841	.873
N= 22	.367	.394	.421	.449	.476	.504	.532	.561	.589	.618	.647	.676	.706	.736	.767	.798	.829	.861
N= 23	.358	.385	.412	.440	.467	.495	.523	.551	.579	.608	.637	.666	.696	.726	.756	.787	.818	.850
N= 24	.350	.377	.404	.431	.459	.486	.514	.542	.570	.599	.628	.657	.686	.716	.746	.777	.808	.840
N= 25	.342	.369	.396	.423	.451	.478	.506	.534	.562	.590	.619	.648	.677	.707	.737	.768	.799	.830
N= 26	.335	.362	.389	.416	.443	.471	.498	.526	.554	.582	.611	.640	.669	.699	.729	.759	.790	.821
N= 27	.328	.355	.382	.409	.436	.463	.491	.519	.547	.575	.603	.632	.661	.691	.721	.751	.782	.813
N= 28	.322	.349	.375	.402	.429	.457	.484	.512	.540	.568	.596	.625	.654	.684	.713	.743	.774	.805
N= 29	.316	.343	.369	.396	.423	.450	.478	.505	.533	.561	.590	.618	.647	.677	.706	.736	.767	.798
N= 30	.310	.337	.363	.390	.417	.444	.472	.499	.527	.555	.583	.612	.641	.670	.700	.730	.760	.791
N= 31	.305	.331	.358	.385	.412	.439	.466	.493	.521	.549	.577	.606	.635	.664	.693	.723	.753	.784
N= 32	.300	.326	.353	.379	.406	.433	.461	.488	.516	.544	.572	.600	.629	.658	.687	.717	.747	.778
N= 33	.295	.321	.348	.374	.401	.428	.455	.483	.510	.538	.566	.595	.623	.652	.682	.711	.742	.772
N= 34	.290	.317	.343	.370	.396	.423	.451	.478	.505	.533	.561	.589	.618	.647	.676	.706	.736	.767
N= 35	.286	.312	.339	.365	.392	.419	.446	.473	.501	.528	.556	.585	.613	.642	.671	.701	.731	.761
N= 36	.282	.308	.334	.361	.387	.414	.441	.469	.496	.524	.552	.580	.608	.637	.666	.695	.726	.756
N= 37	.278	.304	.330	.357	.383	.410	.437	.464	.492	.519	.547	.575	.604	.632	.662	.691	.721	.751
N= 38	.274	.300	.326	.353	.379	.406	.433	.460	.487	.515	.543	.571	.599	.628	.657	.687	.716	.747
N= 39	.270	.296	.322	.349	.375	.402	.429	.456	.483	.511	.539	.567	.595	.624	.653	.682	.712	.742
N= 40	.266	.293	.319	.345	.372	.398	.425	.452	.480	.507	.535	.563	.591	.620	.649	.678	.708	.738
N= 41	.263	.289	.315	.342	.368	.395	.422	.449	.476	.503	.531	.559	.587	.616	.645	.674	.704	.734
N= 42	.260	.286	.312	.338	.365	.391	.418	.445	.472	.500	.527	.555	.584	.612	.641	.670	.700	.730
N= 43	.256	.283	.309	.335	.362	.388	.415	.442	.469	.496	.524	.552	.580	.609	.637	.667	.696	.726
N= 44	.253	.280	.306	.332	.358	.385	.412	.439	.466	.493	.521	.549	.577	.605	.634	.663	.693	.723
N= 45	.250	.277	.303	.329	.355	.382	.409	.435	.463	.490	.517	.545	.573	.602	.631	.660	.689	.719
N= 46	.248	.274	.300	.326	.352	.379	.406	.432	.459	.487	.514	.542	.570	.599	.627	.656	.686	.716
N= 47	.245	.271	.297	.323	.350	.376	.403	.430	.457	.484	.511	.539	.567	.595	.624	.653	.683	.712
N= 48	.242	.268	.294	.320	.347	.373	.400	.427	.454	.481	.508	.536	.564	.592	.621	.650	.679	.709
N= 49	.240	.266	.292	.318	.344	.371	.397	.424	.451	.478	.506	.533	.561	.590	.618	.647	.676	.706
N= 50	.237	.263	.289	.315	.342	.368	.395	.421	.448	.475	.503	.530	.558	.587	.615	.644	.674	.703
N= 55	.226	.252	.278	.304	.330	.356	.383	.409	.436	.463	.490	.518	.546	.574	.602	.631	.660	.690
N= 60	.216	.242	.267	.293	.320	.346	.372	.399	.425	.452	.480	.507	.535	.563	.591	.620	.649	.678
N= 65	.207	.233	.259	.285	.311	.337	.363	.390	.416	.443	.470	.498	.525	.553	.581	.610	.639	.668
N= 70	.199	.225	.251	.277	.303	.329	.355	.381	.408	.435	.462	.489	.517	.544	.573	.601	.630	.659
N= 75	.192	.218	.244	.270	.295	.322	.348	.374	.401	.427	.454	.482	.509	.537	.565	.593	.622	.651
N= 80	.186	.212	.237	.263	.289	.315	.341	.368	.394	.421	.448	.475	.502	.530	.558	.586	.615	.644
N= 85	.180	.206	.232	.257	.283	.309	.335	.362	.388	.415	.442	.469	.496	.524	.552	.580	.608	.637

N=	13	.496	.523	.552	.581	.611	.641	.671	.701	.732	.763	.794	.826	.858	.890	.923	.957	.991	1.026
N=	14	.473	.502	.531	.559	.589	.618	.648	.678	.708	.738	.769	.801	.832	.864	.897	.930	.964	.998
N=	15	.455	.483	.511	.540	.569	.598	.627	.657	.687	.717	.748	.779	.810	.842	.874	.907	.940	.973
N=	16	.438	.466	.494	.523	.552	.580	.609	.639	.668	.698	.729	.759	.790	.822	.854	.886	.919	.952
N=	17	.423	.451	.479	.507	.536	.565	.593	.622	.652	.682	.712	.742	.773	.804	.835	.867	.900	.933
N=	18	.410	.438	.466	.494	.522	.550	.579	.608	.637	.666	.696	.726	.757	.788	.819	.851	.883	.916
N=	19	.398	.425	.453	.481	.509	.537	.566	.594	.623	.653	.682	.712	.742	.773	.804	.836	.867	.900
N=	20	.387	.414	.442	.469	.497	.525	.554	.582	.611	.640	.669	.699	.729	.760	.791	.822	.854	.886
N=	21	.376	.404	.431	.459	.486	.514	.543	.571	.600	.629	.658	.687	.717	.747	.778	.809	.841	.873
N=	22	.367	.394	.421	.449	.476	.504	.532	.561	.589	.618	.647	.676	.706	.736	.767	.798	.829	.861
N=	23	.358	.385	.412	.440	.467	.495	.523	.551	.579	.608	.637	.666	.696	.726	.756	.787	.818	.850
N=	24	.350	.377	.404	.431	.459	.486	.514	.542	.570	.599	.628	.657	.686	.716	.746	.777	.808	.840
N=	25	.342	.369	.396	.423	.451	.478	.506	.534	.562	.590	.619	.648	.677	.707	.737	.768	.799	.830
N=	26	.335	.362	.389	.416	.443	.471	.498	.526	.554	.582	.611	.640	.669	.699	.729	.759	.790	.821
N=	27	.328	.355	.382	.409	.436	.463	.491	.519	.547	.575	.603	.632	.661	.691	.721	.751	.782	.813
N=	28	.322	.349	.375	.402	.429	.457	.484	.512	.540	.568	.596	.625	.654	.684	.713	.743	.774	.805
N=	29	.316	.343	.369	.396	.423	.450	.478	.505	.533	.561	.590	.618	.647	.677	.706	.736	.767	.798
N=	30	.310	.337	.363	.390	.417	.444	.472	.499	.527	.555	.583	.612	.641	.670	.700	.730	.760	.791
N=	31	.305	.331	.358	.385	.412	.439	.466	.493	.521	.549	.577	.606	.635	.664	.693	.723	.753	.784
N=	32	.300	.326	.353	.379	.406	.433	.461	.488	.516	.544	.572	.600	.629	.658	.687	.717	.747	.778
N=	33	.295	.321	.348	.374	.401	.428	.455	.483	.510	.538	.566	.595	.623	.652	.682	.711	.742	.772
N=	34	.290	.317	.343	.370	.396	.423	.451	.478	.505	.533	.561	.589	.618	.647	.676	.706	.736	.767
N=	35	.286	.312	.339	.365	.392	.419	.446	.473	.501	.528	.556	.585	.613	.642	.671	.701	.731	.761
N=	36	.282	.308	.334	.361	.387	.414	.441	.469	.496	.524	.552	.580	.608	.637	.666	.696	.726	.756
N=	37	.278	.304	.330	.357	.383	.410	.437	.464	.492	.519	.547	.575	.604	.632	.662	.691	.721	.751
N=	38	.274	.300	.325	.353	.379	.406	.433	.460	.487	.515	.543	.571	.599	.628	.657	.687	.716	.747
N=	39	.270	.296	.322	.349	.375	.402	.429	.456	.483	.511	.539	.567	.595	.624	.653	.682	.712	.742
N=	40	.266	.293	.319	.345	.372	.398	.425	.452	.480	.507	.535	.563	.591	.620	.649	.678	.708	.738
N=	41	.263	.289	.315	.342	.368	.395	.422	.449	.476	.503	.531	.559	.587	.616	.645	.674	.704	.734
N=	42	.260	.286	.312	.338	.365	.391	.418	.445	.472	.500	.527	.555	.584	.612	.641	.670	.700	.730
N=	43	.256	.283	.309	.335	.362	.388	.415	.442	.469	.496	.524	.552	.580	.609	.637	.667	.696	.726
N=	44	.253	.280	.306	.332	.358	.385	.412	.439	.466	.493	.521	.549	.577	.605	.634	.663	.693	.723
N=	45	.250	.277	.303	.329	.355	.382	.409	.435	.463	.490	.517	.545	.573	.602	.631	.660	.689	.719
N=	46	.248	.274	.300	.326	.352	.379	.406	.432	.459	.487	.514	.542	.570	.599	.627	.656	.686	.716
N=	47	.245	.271	.297	.323	.350	.376	.403	.430	.457	.484	.511	.539	.567	.595	.624	.653	.683	.712
N=	48	.242	.268	.294	.320	.347	.373	.400	.427	.454	.481	.508	.536	.564	.592	.621	.650	.679	.709
N=	49	.240	.266	.292	.318	.344	.371	.397	.424	.451	.478	.506	.533	.561	.590	.618	.647	.676	.706
N=	50	.237	.263	.289	.315	.342	.368	.395	.421	.448	.475	.503	.530	.558	.587	.615	.644	.674	.703
N=	55	.226	.252	.278	.304	.330	.356	.383	.409	.436	.463	.490	.518	.546	.574	.602	.631	.660	.690
N=	60	.216	.242	.267	.293	.320	.346	.372	.399	.425	.452	.480	.507	.535	.563	.591	.620	.649	.678
N=	65	.207	.233	.259	.285	311	.337	.363	.390	.416	.443	.470	.498	.525	.553	.581	.610	.639	.668
N=	70	.199	.225	.251	.277	.303	.329	.355	.381	.408	.435	.462	.489	.517	.544	.573	.601	.630	.659
N=	75	.192	.218	.244	.270	.295	.322	.348	.374	.401	.427	.454	.482	.509	.537	.565	.593	.622	.651
N=	80	.186	.212	.237	.263	.289	.315	.341	.368	.394	.421	.448	.475	.502	.530	.558	.586	.615	.644
N=	85	.180	.206	.232	.257	.283	.309	.335	.362	.388	.415	.442	.469	.496	.524	.552	.580	.608	.637
N=	90	.175	.201	.226	.252	.278	.304	.330	.356	.383	.409	.436	.463	.490	.518	.546	.574	.603	.631
N=	95	.170	.196	.222	.247	.273	.299	.325	.351	.378	.404	.431	.458	.485	.513	.541	.569	.597	.626
N=	100	.166	.192	.217	.243	.269	.294	.320	.347	.373	.399	.426	.453	.480	.508	.536	.564	.592	.621
N=	110	.158	.184	.209	.235	.260	.286	.312	.338	.365	.391	.418	.445	.472	.499	.527	.555	.583	.612
N=	120	.151	.177	.202	.228	.253	.279	.305	.331	.357	.384	.411	.437	.464	.492	.519	.547	.576	.604
N=	130	.145	.171	.196	.222	.247	.273	.299	.325	.351	.378	.404	.431	.458	.485	.513	.541	.569	.598
N=	140	.140	.165	.191	.216	.242	.268	.293	.319	.346	.372	.398	.425	.452	.479	.507	.535	.563	.592
N=	150	.135	.160	.186	.211	.237	.263	.288	.314	.341	.367	.393	.420	.447	.474	.502	.530	.558	.586
N=	160	.131	.156	.182	.207	.233	.258	.284	.310	.336	.362	.389	.415	.442	.470	.497	.525	.553	.581
N=	170	.127	.152	.178	.203	.229	.254	.280	.306	.332	.358	.385	.411	.438	.465	.493	.520	.549	.577
N=	180	.123	.149	.174	.199	.225	.250	.276	.302	.328	.354	.381	.407	.434	.461	.489	.517	.545	.573
N=	190	.120	.145	.171	.196	.221	.247	.273	.299	.325	.351	.377	.404	.431	.458	.485	.513	.541	.569
N=	200	.117	.142	.167	.193	.218	.244	.270	.296	.322	.348	.374	.401	.427	.455	.482	.510	.538	.566
N=	250	.104	.130	.155	.180	.206	.231	.257	.283	.309	.335	.361	.388	.414	.441	.468	.496	.524	.552
N=	300	.095	.120	.146	.171	.196	.222	.248	.273	.299	.325	.351	.378	.405	.431	.459	.486	.514	.542
N=	400	.082	.108	.133	.158	.183	.209	.234	.260	.286	.312	.338	.364	.391	.418	.445	.472	.500	.528
N=	500	.074	.099	.124	.149	.175	.200	.226	.251	.277	.303	.329	.355	.382	.409	.436	.463	.491	.518
N=	600	.067	.092	.118	.143	.168	.193	.219	.245	.270	.296	.322	.349	.375	.402	.429	.456	.484	.511
N=	700	.062	.087	.113	.138	.163	.188	.214	.239	.265	.291	.317	.343	.370	.397	.423	.451	.478	.506
N=	800	.058	.083	.108	.134	.159	.184	.210	.235	.261	.287	.313	.339	.366	.392	.419	.446	.474	.502
N=	900	.055	.080	.105	.130	.156	.181	.206	.232	.258	.284	.310	.336	.362	.389	.416	.443	.470	.498
N=	1000	.052	.077	.102	.127	.153	.178	.204	.229	.255	.281	.307	.333	.359	.386	.413	.440	.467	.495
N=	9999	.016	.041	.067	.092	.117	.142	.167	.193	.218	.244	.270	.296	.322	.349	.375	.402	.430	.457
N=	50000	.007	.032	.057	.083	.108	.133	.158	.184	.209	.235	.261	.287	.313	.339	.366	.393	.420	.448

TABLE II (Cont.)

FACTORS OF ONE-SIDED TOLERANCE LIMITS FOR A NORMAL DISTRIBUTION

95% CONFIDENCE

Proportion of Population Covered →

	.68	.69	.70	.71	.72	.73	.74	.75	.76	.77	.78	.79	.80	.81	.82	.83	.84	.85
N= 3	3.085	3.180	3.277	3.377	3.480	3.586	3.694	3.806	3.922	4.041	4.164	4.292	4.424	4.562	4.705	4.854	5.011	5.175
N= 4	2.136	2.200	2.265	2.332	2.401	2.471	2.543	2.618	2.694	2.773	2.854	2.939	3.026	3.117	3.211	3.309	3.412	3.520
N= 5	1.755	1.807	1.861	1.916	1.972	2.030	2.089	2.150	2.212	2.277	2.343	2.412	2.483	2.557	2.634	2.714	2.798	2.885
N= 6	1.543	1.590	1.638	1.687	1.737	1.788	1.841	1.895	1.951	2.008	2.067	2.128	2.191	2.256	2.324	2.395	2.469	2.546
N= 7	1.407	1.450	1.495	1.540	1.586	1.634	1.682	1.732	1.784	1.836	1.891	1.947	2.005	2.065	2.128	2.193	2.261	2.332
N= 8	1.310	1.351	1.393	1.436	1.480	1.525	1.571	1.618	1.666	1.716	1.767	1.820	1.875	1.932	1.991	2.053	2.117	2.184
N= 9	1.237	1.276	1.317	1.358	1.400	1.443	1.487	1.532	1.579	1.626	1.675	1.726	1.779	1.833	1.889	1.948	2.009	2.074
N= 10	1.179	1.218	1.257	1.297	1.337	1.379	1.421	1.465	1.510	1.556	1.604	1.653	1.703	1.756	1.810	1.867	1.926	1.988
N= 11	1.133	1.170	1.208	1.247	1.286	1.327	1.368	1.411	1.454	1.499	1.546	1.593	1.642	1.693	1.746	1.801	1.859	1.919
N= 12	1.094	1.130	1.167	1.205	1.244	1.284	1.324	1.366	1.409	1.452	1.498	1.544	1.592	1.642	1.694	1.748	1.804	1.862
N= 13	1.061	1.097	1.133	1.170	1.208	1.247	1.287	1.328	1.370	1.413	1.457	1.503	1.550	1.599	1.650	1.702	1.757	1.815
N= 14	1.032	1.068	1.104	1.140	1.178	1.216	1.255	1.296	1.337	1.379	1.423	1.468	1.514	1.562	1.612	1.664	1.718	1.774
N= 15	1.008	1.042	1.078	1.114	1.151	1.189	1.228	1.267	1.308	1.350	1.393	1.437	1.483	1.530	1.579	1.630	1.683	1.739
N= 16	.986	1.020	1.055	1.091	1.128	1.165	1.204	1.242	1.283	1.324	1.366	1.410	1.455	1.502	1.550	1.601	1.653	1.708
N= 17	.966	1.000	1.035	1.071	1.107	1.144	1.182	1.220	1.260	1.301	1.343	1.386	1.431	1.477	1.525	1.575	1.627	1.681
N= 18	.949	.983	1.017	1.052	1.088	1.125	1.162	1.201	1.240	1.280	1.322	1.365	1.409	1.455	1.502	1.551	1.603	1.656
N= 19	.933	.967	1.001	1.036	1.071	1.107	1.145	1.183	1.222	1.262	1.303	1.345	1.389	1.434	1.481	1.530	1.581	1.634
N= 20	.919	.952	.986	1.020	1.056	1.092	1.129	1.166	1.205	1.245	1.286	1.328	1.371	1.416	1.463	1.511	1.562	1.614
N= 21	.905	.938	.972	1.006	1.042	1.077	1.114	1.151	1.190	1.229	1.270	1.312	1.355	1.399	1.446	1.494	1.544	1.596
N= 22	.893	.926	.960	.994	1.029	1.064	1.101	1.138	1.176	1.215	1.255	1.297	1.340	1.384	1.430	1.478	1.527	1.579
N= 23	.882	.915	.948	.982	1.017	1.052	1.088	1.125	1.163	1.202	1.242	1.283	1.326	1.370	1.416	1.463	1.512	1.564
N= 24	.872	.904	.937	.971	1.006	1.041	1.077	1.114	1.151	1.190	1.230	1.271	1.313	1.357	1.402	1.450	1.499	1.550
N= 25	.862	.894	.927	.961	.995	1.030	1.066	1.103	1.140	1.179	1.218	1.259	1.301	1.345	1.390	1.437	1.486	1.537
N= 26	.853	.885	.918	.952	.986	1.021	1.056	1.093	1.130	1.168	1.208	1.248	1.290	1.334	1.379	1.425	1.474	1.525
N= 27	.844	.877	.909	.943	.977	1.011	1.047	1.083	1.120	1.159	1.198	1.238	1.280	1.323	1.368	1.414	1.463	1.513
N= 28	.837	.869	.901	.934	.968	1.003	1.038	1.074	1.112	1.150	1.189	1.229	1.270	1.313	1.358	1.404	1.452	1.503
N= 29	.829	.861	.894	.927	.960	.995	1.030	1.066	1.103	1.141	1.180	1.220	1.261	1.304	1.349	1.395	1.442	1.493
N= 30	.822	.854	.886	.919	.953	.987	1.022	1.058	1.095	1.133	1.172	1.212	1.253	1.296	1.340	1.385	1.433	1.483
N= 31	.815	.847	.880	.912	.946	.980	1.015	1.051	1.088	1.125	1.164	1.204	1.245	1.287	1.331	1.377	1.425	1.474
N= 32	.809	.841	.873	.906	.939	.973	1.008	1.044	1.081	1.118	1.157	1.196	1.237	1.280	1.323	1.369	1.416	1.466
N= 33	.803	.835	.867	.900	.933	.967	1.002	1.037	1.074	1.111	1.150	1.189	1.230	1.272	1.316	1.361	1.409	1.458
N= 34	.798	.829	.861	.894	.927	.961	.996	1.031	1.067	1.105	1.143	1.183	1.223	1.265	1.309	1.354	1.401	1.450
N= 35	.792	.824	.856	.888	.921	.955	.990	1.025	1.061	1.099	1.137	1.176	1.217	1.259	1.302	1.347	1.394	1.443
N= 36	.787	.818	.850	.883	.916	.950	.984	1.019	1.056	1.093	1.131	1.170	1.210	1.252	1.296	1.341	1.387	1.436
N= 37	.782	.813	.845	.878	.911	.944	.979	1.014	1.050	1.087	1.125	1.164	1.205	1.246	1.290	1.334	1.381	1.430
N= 38	.777	.809	.840	.873	.906	.939	.974	1.009	1.045	1.082	1.120	1.159	1.199	1.241	1.284	1.328	1.375	1.424
N= 39	.773	.804	.836	.868	.901	.934	.969	1.004	1.040	1.077	1.114	1.153	1.194	1.235	1.278	1.323	1.369	1.418
N= 40	.769	.800	.831	.863	.896	.930	.964	.999	1.035	1.072	1.109	1.148	1.188	1.230	1.273	1.317	1.364	1.412
N= 41	.764	.795	.827	.859	.892	.925	.960	.994	1.030	1.067	1.105	1.143	1.183	1.225	1.268	1.312	1.358	1.407
N= 42	.760	.791	.823	.855	.888	.921	.955	.990	1.026	1.062	1.100	1.139	1.179	1.220	1.263	1.307	1.353	1.401
N= 43	.757	.788	.819	.851	.884	.917	.951	.986	1.021	1.058	1.096	1.134	1.174	1.215	1.258	1.302	1.348	1.396
N= 44	.753	.784	.815	.847	.880	.913	.947	.982	1.017	1.054	1.091	1.130	1.170	1.211	1.253	1.297	1.343	1.391
N= 45	.749	.780	.812	.844	.876	.909	.943	.978	1.013	1.050	1.087	1.126	1.165	1.206	1.249	1.293	1.339	1.387
N= 46	.746	.777	.808	.840	.872	.906	.939	.974	1.010	1.046	1.083	1.122	1.161	1.202	1.245	1.289	1.334	1.382
N= 47	.743	.773	.805	.837	.869	.902	.936	.970	1.006	1.042	1.079	1.118	1.157	1.198	1.241	1.285	1.330	1.378
N= 48	.739	.770	.801	.833	.866	.899	.932	.967	1.002	1.039	1.076	1.114	1.154	1.194	1.237	1.281	1.326	1.374
N= 49	.736	.767	.798	.830	.862	.895	.929	.964	.999	1.035	1.072	1.110	1.150	1.191	1.233	1.277	1.322	1.370
N= 50	.733	.764	.795	.827	.859	.892	.926	.960	.996	1.032	1.069	1.107	1.146	1.187	1.229	1.273	1.318	1.366
N= 55	.720	.750	.781	.813	.845	.878	.911	.945	.980	1.016	1.053	1.091	1.130	1.171	1.213	1.256	1.301	1.348
N= 60	.709	.738	.769	.801	.833	.865	.899	.933	.967	1.003	1.040	1.078	1.116	1.157	1.198	1.241	1.286	1.333
N= 65	.699	.728	.759	.790	.822	.854	.887	.921	.956	.992	1.028	1.066	1.104	1.144	1.186	1.229	1.273	1.320
N= 70	.689	.719	.749	.781	.812	.845	.878	.911	.946	.981	1.018	1.055	1.094	1.133	1.175	1.217	1.262	1.308

N=	14	1.032	1.068	1.104	1.140	1.178	1.216	1.255	1.296	1.337	1.379	1.423	1.468	1.514	1.562	1.612	1.664	1.718	1.774
N=	15	1.008	1.042	1.078	1.114	1.151	1.189	1.228	1.267	1.308	1.350	1.393	1.437	1.483	1.530	1.579	1.630	1.683	1.739
N=	16	.985	1.020	1.055	1.091	1.128	1.165	1.203	1.242	1.283	1.324	1.366	1.410	1.455	1.502	1.550	1.601	1.653	1.708
N=	17	.966	1.000	1.035	1.071	1.107	1.144	1.182	1.220	1.260	1.301	1.343	1.386	1.431	1.477	1.525	1.575	1.627	1.681
N=	18	.949	.983	1.017	1.052	1.088	1.125	1.162	1.201	1.240	1.280	1.322	1.365	1.409	1.455	1.502	1.551	1.603	1.656
N=	19	.933	.967	1.001	1.036	1.071	1.107	1.145	1.183	1.222	1.262	1.303	1.345	1.389	1.434	1.481	1.530	1.581	1.634
N=	20	.919	.952	.986	1.020	1.056	1.092	1.129	1.166	1.205	1.245	1.286	1.328	1.371	1.416	1.463	1.511	1.562	1.614
N=	21	.905	.938	.972	1.006	1.042	1.077	1.114	1.151	1.190	1.229	1.270	1.312	1.355	1.399	1.446	1.494	1.544	1.596
N=	22	.893	.926	.960	.994	1.029	1.064	1.101	1.138	1.176	1.215	1.255	1.297	1.340	1.384	1.430	1.478	1.527	1.579
N=	23	.882	.915	.948	.982	1.017	1.052	1.088	1.125	1.163	1.202	1.242	1.283	1.326	1.370	1.416	1.463	1.512	1.564
N=	24	.872	.904	.937	.971	1.006	1.041	1.077	1.114	1.151	1.190	1.230	1.271	1.313	1.357	1.402	1.450	1.499	1.550
N=	25	.862	.894	.927	.961	.995	1.030	1.066	1.103	1.140	1.179	1.218	1.259	1.301	1.345	1.390	1.437	1.486	1.537
N=	26	.853	.885	.918	.952	.986	1.021	1.056	1.093	1.130	1.168	1.208	1.248	1.290	1.334	1.379	1.425	1.474	1.525
N=	27	.844	.877	.909	.943	.977	1.011	1.047	1.083	1.120	1.159	1.198	1.238	1.280	1.323	1.368	1.414	1.463	1.513
N=	28	.837	.869	.901	.934	.968	1.003	1.038	1.074	1.112	1.150	1.189	1.229	1.270	1.313	1.358	1.404	1.452	1.503
N=	29	.829	.861	.894	.927	.960	.995	1.030	1.066	1.103	1.141	1.180	1.220	1.261	1.304	1.349	1.395	1.442	1.493
N=	30	.822	.854	.886	.919	.953	.987	1.022	1.058	1.095	1.133	1.172	1.212	1.253	1.296	1.340	1.385	1.433	1.483
N=	31	.815	.847	.880	.912	.946	.980	1.015	1.051	1.088	1.125	1.164	1.204	1.245	1.287	1.331	1.377	1.425	1.474
N=	32	.809	.841	.873	.906	.939	.973	1.008	1.044	1.081	1.118	1.157	1.196	1.237	1.280	1.323	1.369	1.416	1.465
N=	33	.803	.835	.867	.900	.933	.967	1.002	1.037	1.074	1.111	1.150	1.189	1.230	1.272	1.316	1.361	1.409	1.459
N=	34	.798	.829	.861	.894	.927	.961	.996	1.031	1.067	1.105	1.143	1.183	1.225	1.265	1.309	1.354	1.401	1.450
N=	35	.792	.824	.856	.888	.921	.955	.990	1.025	1.061	1.099	1.137	1.176	1.217	1.259	1.302	1.347	1.394	1.443
N=	36	.787	.818	.850	.883	.916	.950	.984	1.019	1.056	1.093	1.131	1.170	1.210	1.252	1.296	1.341	1.387	1.436
N=	37	.782	.813	.845	.878	.911	.944	.979	1.014	1.050	1.087	1.125	1.164	1.205	1.246	1.290	1.334	1.381	1.430
N=	38	.777	.809	.840	.873	.906	.939	.974	1.009	1.045	1.082	1.120	1.159	1.199	1.241	1.284	1.328	1.375	1.424
N=	39	.773	.804	.836	.868	.901	.934	.969	1.004	1.040	1.077	1.114	1.153	1.194	1.235	1.278	1.323	1.369	1.418
N=	40	.769	.800	.831	.863	.896	.930	.964	.999	1.035	1.072	1.109	1.148	1.188	1.230	1.273	1.317	1.364	1.412
N=	41	.764	.795	.827	.859	.892	.925	.960	.994	1.030	1.067	1.105	1.143	1.183	1.225	1.268	1.312	1.358	1.407
N=	42	.760	.791	.823	.855	.888	.921	.955	.990	1.026	1.062	1.100	1.139	1.179	1.220	1.263	1.307	1.353	1.401
N=	43	.757	.788	.819	.851	.884	.917	.951	.986	1.021	1.058	1.096	1.134	1.174	1.215	1.258	1.302	1.348	1.396
N=	44	.753	.784	.815	.847	.880	.913	.947	.982	1.017	1.054	1.091	1.130	1.170	1.211	1.253	1.297	1.343	1.391
N=	45	.749	.780	.812	.844	.876	.909	.943	.978	1.013	1.050	1.087	1.126	1.165	1.206	1.249	1.293	1.339	1.387
N=	46	.746	.777	.808	.840	.872	.906	.939	.974	1.010	1.046	1.083	1.122	1.161	1.202	1.245	1.289	1.334	1.382
N=	47	.743	.773	.805	.837	.869	.902	.936	.970	1.006	1.042	1.079	1.118	1.157	1.198	1.241	1.285	1.330	1.378
N=	48	.739	.770	.801	.833	.866	.899	.932	.967	1.002	1.039	1.076	1.114	1.154	1.194	1.237	1.281	1.326	1.374
N=	49	.736	.767	.798	.830	.862	.895	.929	.964	.999	1.035	1.072	1.110	1.150	1.191	1.233	1.277	1.322	1.370
N=	50	.733	.764	.795	.827	.859	.892	.926	.960	.996	1.032	1.069	1.107	1.146	1.187	1.229	1.273	1.318	1.366
N=	55	.720	.750	.781	.813	.845	.878	.911	.945	.980	1.016	1.053	1.091	1.130	1.171	1.213	1.256	1.301	1.348
N=	60	.708	.738	.769	.801	.833	.865	.899	.933	.967	1.003	1.040	1.078	1.116	1.157	1.198	1.241	1.286	1.333
N=	65	.698	.728	.759	.790	.822	.854	.887	.921	.956	.992	1.028	1.066	1.104	1.144	1.186	1.229	1.273	1.320
N=	70	.689	.719	.749	.781	.812	.845	.878	.911	.946	.981	1.018	1.055	1.094	1.133	1.175	1.217	1.262	1.308
N=	75	.681	.711	.741	.772	.804	.836	.869	.903	.937	.972	1.009	1.046	1.084	1.124	1.165	1.207	1.252	1.298
N=	80	.673	.703	.734	.765	.796	.828	.861	.895	.929	.964	1.000	1.037	1.076	1.115	1.156	1.198	1.243	1.289
N=	85	.667	.697	.727	.758	.789	.821	.854	.888	.922	.957	.993	1.030	1.068	1.107	1.148	1.190	1.234	1.280
N=	90	.661	.691	.721	.752	.783	.815	.848	.881	.915	.950	.986	1.023	1.061	1.100	1.141	1.183	1.227	1.273
N=	95	.655	.685	.715	.746	.777	.809	.842	.875	.909	.944	.980	1.017	1.055	1.094	1.134	1.176	1.220	1.266
N=	100	.650	.680	.710	.741	.772	.804	.836	.870	.904	.938	.974	1.011	1.049	1.088	1.128	1.170	1.214	1.259
N=	110	.641	.671	.701	.732	.763	.794	.827	.860	.894	.928	.964	1.001	1.038	1.077	1.117	1.159	1.203	1.248
N=	120	.633	.663	.693	.723	.754	.786	.818	.851	.885	.920	.955	.992	1.029	1.068	1.108	1.150	1.193	1.238
N=	130	.627	.656	.686	.716	.747	.779	.811	.844	.878	.912	.947	.984	1.021	1.060	1.100	1.141	1.185	1.230
N=	140	.621	.650	.680	.710	.741	.772	.805	.837	.871	.905	.941	.977	1.014	1.053	1.093	1.134	1.177	1.222
N=	150	.615	.644	.674	.704	.735	.767	.799	.832	.865	.899	.935	.971	1.008	1.046	1.086	1.128	1.170	1.215
N=	160	.610	.639	.669	.699	.730	.762	.794	.826	.860	.894	.929	.965	1.002	1.041	1.080	1.122	1.164	1.209
N=	170	.606	.635	.665	.695	.726	.757	.789	.821	.855	.889	.924	.960	.997	1.036	1.075	1.116	1.159	1.204
N=	180	.602	.631	.661	.691	.721	.753	.785	.817	.850	.885	.920	.956	.993	1.031	1.070	1.111	1.154	1.198
N=	190	.598	.627	.657	.687	.717	.749	.781	.813	.846	.880	.915	.951	.988	1.026	1.066	1.107	1.149	1.194
N=	200	.595	.624	.653	.683	.714	.745	.777	.809	.843	.877	.912	.947	.984	1.022	1.062	1.103	1.145	1.190
N=	250	.581	.610	.639	.669	.700	.731	.762	.794	.828	.861	.896	.932	.969	1.006	1.046	1.086	1.128	1.172
N=	300	.571	.599	.629	.659	.689	.720	.751	.784	.817	.850	.885	.920	.957	.995	1.034	1.074	1.116	1.160
N=	400	.556	.585	.614	.644	.674	.705	.736	.768	.801	.835	.869	.904	.941	.978	1.017	1.057	1.099	1.143
N=	500	.547	.576	.605	.634	.664	.695	.726	.758	.791	.824	.859	.894	.930	.967	1.006	1.046	1.088	1.131
N=	600	.540	.568	.597	.627	.657	.688	.719	.751	.783	.817	.851	.886	.922	.959	.998	1.038	1.079	1.122
N=	700	.534	.563	.592	.621	.651	.682	.713	.745	.777	.811	.845	.880	.916	.953	.992	1.031	1.073	1.116
N=	800	.530	.558	.588	.617	.647	.677	.709	.740	.773	.806	.840	.875	.911	.948	.986	1.026	1.068	1.111
N=	900	.526	.555	.584	.613	.643	.674	.705	.736	.769	.802	.836	.871	.907	.944	.982	1.022	1.063	1.106
N=	1000	.523	.552	.581	.610	.640	.670	.702	.733	.766	.799	.833	.868	.903	.941	.979	1.018	1.060	1.103
N=	9999	.485	.513	.542	.571	.601	.631	.661	.693	.725	.757	.791	.825	.861	.897	.935	.974	1.015	1.057
N=	50000	.475	.504	.532	.561	.591	.621	.651	.683	.714	.747	.781	.815	.850	.887	.924	.963	1.003	1.046

TABLE II (Cont.)

FACTORS OF ONE-SIDED TOLERANCE LIMITS FOR A NORMAL DISTRIBUTION

95% CONFIDENCE

Proportion of Population Covered →

	.86	.87	.88	.89	.90	.91	.92	.93	.94	.95	.96	.97	.98	.99	.995	.999
N= 3	5.348	5.531	5.723	5.932	6.155	6.397	6.660	6.952	7.280	7.656	8.100	8.650	9.385	10.553	11.628	13.857
N= 4	3.633	3.753	3.879	4.016	4.162	4.320	4.492	4.683	4.898	5.144	5.435	5.795	6.277	7.042	7.748	9.214
N= 5	2.977	3.075	3.177	3.288	3.407	3.535	3.675	3.829	4.003	4.203	4.438	4.730	5.121	5.741	6.313	7.502
N= 6	2.627	2.713	2.804	2.902	3.006	3.119	3.242	3.379	3.532	3.708	3.915	4.172	4.516	5.062	5.565	6.612
N= 7	2.407	2.486	2.569	2.659	2.755	2.859	2.972	3.098	3.238	3.399	3.590	3.826	4.141	4.642	5.103	6.063
N= 8	2.254	2.329	2.407	2.492	2.582	2.679	2.786	2.904	3.036	3.187	3.366	3.588	3.884	4.354	4.787	5.687
N= 9	2.141	2.212	2.287	2.368	2.454	2.547	2.648	2.761	2.887	3.031	3.202	3.413	3.695	4.143	4.556	5.413
N= 10	2.053	2.122	2.193	2.272	2.355	2.444	2.542	2.650	2.772	2.911	3.075	3.278	3.550	3.981	4.378	5.203
N= 11	1.982	2.049	2.118	2.194	2.275	2.362	2.457	2.562	2.679	2.814	2.974	3.170	3.434	3.851	4.236	5.035
N= 12	1.924	1.989	2.057	2.131	2.209	2.294	2.387	2.489	2.604	2.735	2.891	3.083	3.339	3.746	4.121	4.899
N= 13	1.875	1.939	2.005	2.078	2.155	2.238	2.329	2.429	2.541	2.670	2.822	3.009	3.260	3.658	4.025	4.785
N= 14	1.833	1.896	1.961	2.033	2.108	2.190	2.279	2.377	2.487	2.614	2.763	2.947	3.193	3.584	3.943	4.689
N= 15	1.797	1.859	1.923	1.994	2.068	2.148	2.236	2.333	2.441	2.566	2.712	2.893	3.135	3.520	3.873	4.607
N= 16	1.765	1.827	1.890	1.959	2.033	2.112	2.198	2.294	2.401	2.523	2.668	2.847	3.085	3.464	3.812	4.535
N= 17	1.736	1.798	1.861	1.929	2.002	2.080	2.165	2.260	2.365	2.486	2.629	2.805	3.041	3.414	3.758	4.471
N= 18	1.713	1.772	1.834	1.902	1.974	2.051	2.135	2.229	2.333	2.453	2.594	2.768	3.001	3.370	3.710	4.414
N= 19	1.690	1.749	1.811	1.877	1.948	2.025	2.109	2.201	2.304	2.423	2.562	2.735	2.965	3.330	3.667	4.364
N= 20	1.670	1.728	1.789	1.855	1.926	2.002	2.084	2.176	2.278	2.396	2.534	2.705	2.933	3.295	3.628	4.318
N= 21	1.651	1.709	1.769	1.835	1.905	1.980	2.062	2.153	2.255	2.371	2.508	2.678	2.904	3.262	3.592	4.276
N= 22	1.634	1.691	1.752	1.817	1.886	1.961	2.042	2.132	2.233	2.349	2.485	2.653	2.877	3.233	3.560	4.238
N= 23	1.618	1.675	1.735	1.800	1.869	1.943	2.024	2.113	2.213	2.328	2.463	2.630	2.853	3.206	3.530	4.203
N= 24	1.604	1.660	1.720	1.784	1.853	1.926	2.007	2.096	2.195	2.309	2.443	2.609	2.830	3.181	3.503	4.171
N= 25	1.590	1.647	1.706	1.770	1.838	1.911	1.991	2.079	2.178	2.291	2.425	2.589	2.809	3.157	3.478	4.142
N= 26	1.578	1.634	1.693	1.756	1.824	1.897	1.976	2.064	2.162	2.275	2.408	2.571	2.790	3.136	3.454	4.114
N= 27	1.566	1.622	1.680	1.744	1.811	1.884	1.963	2.050	2.148	2.260	2.392	2.554	2.772	3.116	3.433	4.089
N= 28	1.555	1.611	1.669	1.732	1.799	1.871	1.950	2.037	2.134	2.245	2.377	2.539	2.755	3.097	3.412	4.065
N= 29	1.545	1.600	1.658	1.721	1.788	1.860	1.938	2.024	2.121	2.232	2.363	2.524	2.739	3.080	3.393	4.043
N= 30	1.535	1.591	1.648	1.711	1.777	1.849	1.927	2.013	2.109	2.220	2.350	2.510	2.724	3.064	3.376	4.022
N= 31	1.526	1.581	1.639	1.701	1.767	1.838	1.916	2.002	2.098	2.208	2.337	2.497	2.710	3.048	3.359	4.002
N= 32	1.518	1.572	1.630	1.692	1.758	1.829	1.906	1.992	2.087	2.197	2.326	2.485	2.697	3.034	3.343	3.984
N= 33	1.510	1.564	1.621	1.683	1.749	1.820	1.897	1.982	2.077	2.186	2.315	2.473	2.685	3.020	3.328	3.966
N= 34	1.502	1.556	1.613	1.675	1.740	1.811	1.888	1.972	2.067	2.176	2.304	2.462	2.673	3.007	3.314	3.949
N= 35	1.495	1.549	1.605	1.667	1.732	1.803	1.879	1.964	2.058	2.167	2.294	2.452	2.662	2.994	3.300	3.934
N= 36	1.488	1.542	1.598	1.659	1.724	1.795	1.871	1.955	2.050	2.158	2.285	2.442	2.651	2.983	3.287	3.919
N= 37	1.481	1.535	1.591	1.652	1.717	1.787	1.863	1.947	2.041	2.149	2.276	2.432	2.641	2.972	3.275	3.904
N= 38	1.475	1.528	1.585	1.646	1.710	1.780	1.856	1.940	2.033	2.141	2.267	2.423	2.631	2.961	3.264	3.891
N= 39	1.469	1.522	1.578	1.639	1.703	1.773	1.849	1.932	2.026	2.133	2.259	2.415	2.622	2.951	3.253	3.878
N= 40	1.463	1.516	1.572	1.633	1.697	1.766	1.842	1.925	2.019	2.125	2.251	2.406	2.613	2.941	3.242	3.865
N= 41	1.457	1.510	1.566	1.627	1.691	1.760	1.836	1.919	2.012	2.118	2.244	2.398	2.605	2.931	3.232	3.853
N= 42	1.452	1.505	1.561	1.621	1.685	1.754	1.829	1.912	2.005	2.111	2.236	2.391	2.597	2.923	3.222	3.842
N= 43	1.447	1.500	1.555	1.616	1.679	1.748	1.823	1.906	1.999	2.105	2.230	2.383	2.589	2.914	3.213	3.831
N= 44	1.442	1.495	1.550	1.610	1.674	1.743	1.818	1.900	1.993	2.098	2.223	2.376	2.581	2.906	3.204	3.821
N= 45	1.437	1.490	1.545	1.605	1.669	1.737	1.812	1.894	1.987	2.092	2.216	2.370	2.574	2.898	3.195	3.810
N= 46	1.432	1.485	1.540	1.600	1.664	1.732	1.807	1.889	1.981	2.086	2.210	2.363	2.567	2.890	3.187	3.801
N= 47	1.428	1.481	1.536	1.596	1.659	1.727	1.802	1.884	1.976	2.081	2.204	2.357	2.561	2.883	3.179	3.791
N= 48	1.424	1.476	1.531	1.591	1.654	1.723	1.797	1.879	1.970	2.075	2.199	2.351	2.554	2.876	3.171	3.782
N= 49	1.420	1.472	1.527	1.587	1.650	1.718	1.792	1.874	1.965	2.070	2.193	2.345	2.548	2.869	3.164	3.774
N= 50	1.416	1.468	1.523	1.582	1.645	1.713	1.787	1.869	1.960	2.065	2.188	2.340	2.542	2.862	3.156	3.765
N= 55	1.398	1.450	1.504	1.563	1.626	1.693	1.767	1.848	1.938	2.042	2.164	2.314	2.515	2.832	3.124	3.727
N=	1.382	1.434	1.488	1.547	1.609	1.676	1.749	1.829	1.919	2.022	2.143	2.293	2.492	2.807	3.096	3.695
N= 65	1.369	1.420	1.474	1.532	1.594	1.661	1.733	1.813	1.903	2.005	2.125	2.274	2.472	2.785	3.072	3.667
N= 70	1.357	1.408	1.462	1.520	1.581	1.647	1.720	1.799	1.888	1.990	2.109	2.257	2.454	2.765	3.051	3.642
N= 75	1.346	1.397	1.451	1.508	1.570	1.636	1.707	1.787	1.875	1.976	2.096	2.242	2.438	2.748	3.032	3.620
N= 80	1.337	1.388	1.441	1.498	1.559	1.625	1.696	1.775	1.863	1.964	2.083	2.229	2.424	2.732	3.015	3.601
N= 85	1.328	1.379	1.432	1.489	1.550	1.615	1.687	1.765	1.853	1.953	2.072	2.217	2.412	2.719	3.000	3.583
N= 90	1.321	1.371	1.424	1.481	1.541	1.605	1.678	1.756	1.844	1.943	2.062	2.207	2.401	2.708	2.988	3.568

N=	14	1.833	1.896	1.961	2.033	2.108	2.190	2.279	2.377	2.487	2.614	2.763	2.947	3.193	3.584	3.943	4.689
N=	15	1.797	1.859	1.923	1.994	2.068	2.148	2.236	2.333	2.441	2.566	2.712	2.893	3.135	3.520	3.873	4.607
N=	16	1.766	1.827	1.890	1.959	2.033	2.112	2.198	2.294	2.401	2.523	2.668	2.847	3.085	3.464	3.812	4.535
N=	17	1.738	1.798	1.861	1.929	2.002	2.080	2.165	2.260	2.365	2.486	2.629	2.805	3.041	3.414	3.758	4.471
N=	18	1.713	1.772	1.834	1.902	1.974	2.051	2.135	2.229	2.333	2.453	2.594	2.768	3.001	3.370	3.710	4.414
N=	19	1.690	1.749	1.811	1.877	1.948	2.025	2.109	2.201	2.304	2.423	2.562	2.735	2.965	3.330	3.667	4.364
N=	20	1.670	1.728	1.789	1.855	1.926	2.002	2.084	2.176	2.278	2.396	2.534	2.705	2.933	3.295	3.628	4.318
N=	21	1.651	1.709	1.769	1.835	1.905	1.980	2.062	2.153	2.255	2.371	2.508	2.678	2.904	3.262	3.592	4.276
N=	22	1.634	1.691	1.752	1.817	1.886	1.961	2.042	2.132	2.233	2.349	2.485	2.653	2.877	3.233	3.560	4.238
N=	23	1.618	1.675	1.735	1.800	1.869	1.943	2.024	2.113	2.213	2.328	2.463	2.630	2.853	3.206	3.530	4.203
N=	24	1.604	1.660	1.720	1.784	1.853	1.926	2.007	2.096	2.195	2.309	2.443	2.609	2.830	3.181	3.503	4.171
N=	25	1.590	1.647	1.706	1.770	1.838	1.911	1.991	2.079	2.178	2.291	2.425	2.589	2.809	3.157	3.478	4.142
N=	26	1.578	1.634	1.693	1.756	1.824	1.897	1.976	2.064	2.162	2.275	2.408	2.571	2.790	3.136	3.454	4.114
N=	27	1.566	1.622	1.680	1.744	1.811	1.884	1.963	2.050	2.148	2.260	2.392	2.554	2.772	3.116	3.433	4.089
N=	28	1.555	1.611	1.669	1.732	1.799	1.871	1.950	2.037	2.134	2.245	2.377	2.539	2.755	3.097	3.412	4.065
N=	29	1.545	1.600	1.658	1.721	1.788	1.860	1.938	2.024	2.121	2.232	2.363	2.524	2.739	3.080	3.393	4.043
N=	30	1.535	1.591	1.648	1.711	1.777	1.849	1.927	2.013	2.109	2.220	2.350	2.510	2.724	3.064	3.376	4.022
N=	31	1.526	1.581	1.639	1.701	1.767	1.838	1.916	2.002	2.098	2.208	2.337	2.497	2.710	3.048	3.359	4.002
N=	32	1.518	1.572	1.630	1.692	1.758	1.829	1.906	1.992	2.087	2.197	2.326	2.485	2.697	3.034	3.343	3.984
N=	33	1.510	1.564	1.621	1.683	1.749	1.820	1.897	1.982	2.077	2.186	2.315	2.473	2.685	3.020	3.328	3.966
N=	34	1.502	1.556	1.613	1.675	1.740	1.811	1.888	1.972	2.067	2.176	2.304	2.462	2.673	3.007	3.314	3.949
N=	35	1.495	1.549	1.605	1.667	1.732	1.803	1.879	1.964	2.058	2.167	2.294	2.452	2.662	2.994	3.300	3.934
N=	36	1.488	1.542	1.598	1.659	1.724	1.795	1.871	1.955	2.050	2.158	2.285	2.442	2.651	2.983	3.287	3.919
N=	37	1.481	1.535	1.591	1.652	1.717	1.787	1.863	1.947	2.041	2.149	2.276	2.432	2.641	2.972	3.275	3.904
N=	38	1.475	1.528	1.585	1.646	1.710	1.780	1.856	1.940	2.033	2.141	2.267	2.423	2.631	2.961	3.264	3.891
N=	39	1.469	1.522	1.578	1.639	1.703	1.773	1.849	1.932	2.026	2.133	2.259	2.415	2.622	2.951	3.253	3.878
N=	40	1.463	1.516	1.572	1.633	1.697	1.768	1.842	1.925	2.019	2.125	2.251	2.406	2.613	2.941	3.242	3.865
N=	41	1.457	1.510	1.566	1.627	1.691	.760	1.836	1.919	2.012	2.118	2.244	2.398	2.605	2.931	3.232	3.853
N=	42	1.452	1.505	1.561	1.621	1.685	1.754	1.829	1.912	2.005	2.111	2.236	2.391	2.597	2.923	3.222	3.842
N=	43	1.447	1.500	1.555	1.616	1.679	1.748	1.823	1.906	1.999	2.105	2.230	2.383	2.589	2.914	3.213	3.831
N=	44	1.442	1.495	1.550	1.610	1.674	1.743	1.818	1.900	1.993	2.098	2.223	2.376	2.581	2.906	3.204	3.821
N=	45	1.437	1.490	1.545	1.605	1.669	1.737	1.812	1.894	1.987	2.092	2.216	2.370	2.574	2.898	3.195	3.810
N=	46	1.432	1.485	1.540	1.600	1.664	1.732	1.807	1.889	1.981	2.086	2.210	2.363	2.567	2.890	3.187	3.801
N=	47	1.428	1.481	1.536	1.596	1.659	1.727	1.802	1.884	1.976	2.081	2.204	2.357	2.561	2.883	3.179	3.791
N=	48	1.424	1.476	1.531	1.591	1.654	1.723	1.797	1.879	1.970	2.075	2.199	2.351	2.554	2.876	3.171	3.782
N=	49	1.420	1.472	1.527	1.587	1.650	1.718	1.792	1.874	1.965	2.070	2.193	2.345	2.548	2.869	3.164	3.774
N=	50	1.416	1.468	1.523	1.582	1.645	1.713	1.787	1.869	1.960	2.065	2.188	2.340	2.542	2.862	3.156	3.765
N=	55	1.398	1.450	1.504	1.563	1.626	1.693	1.767	1.848	1.938	2.042	2.164	2.314	2.515	2.832	3.124	3.727
N=	60	1.382	1.434	1.488	1.547	1.609	1.676	1.749	1.829	1.919	2.022	2.143	2.293	2.492	2.807	3.096	3.695
N=	65	1.369	1.420	1.474	1.532	1.594	1.661	1.733	1.813	1.903	2.005	2.125	2.274	2.472	2.785	3.072	3.667
N=	70	1.357	1.408	1.462	1.520	1.581	1.647	1.720	1.799	1.888	1.990	2.109	2.257	2.454	2.765	3.051	3.642
N=	75	1.346	1.397	1.451	1.508	1.570	1.636	1.707	1.787	1.875	1.976	2.096	2.242	2.436	2.748	3.032	3.620
N=	80	1.337	1.385	1.441	1.498	1.559	1.625	1.696	1.775	1.863	1.964	2.083	2.229	2.424	2.732	3.015	3.601
N=	85	1.328	1.379	1.432	1.489	1.550	1.615	1.687	1.765	1.853	1.953	2.072	2.217	2.412	2.719	3.000	3.583
N=	90	1.321	1.371	1.424	1.481	1.541	1.607	1.678	1.756	1.844	1.944	2.061	2.207	2.400	2.706	2.987	3.567
N=	95	1.314	1.364	1.416	1.473	1.534	1.599	1.670	1.748	1.835	1.935	2.052	2.197	2.390	2.694	2.974	3.553
N=	100	1.307	1.357	1.410	1.466	1.527	1.592	1.662	1.740	1.827	1.926	2.044	2.188	2.380	2.684	2.963	3.539
N=	110	1.295	1.345	1.398	1.454	1.514	1.579	1.649	1.726	1.813	1.912	2.028	2.172	2.363	2.665	2.942	3.516
N=	120	1.285	1.335	1.387	1.444	1.503	1.567	1.637	1.715	1.801	1.899	2.015	2.158	2.348	2.649	2.925	3.495
N=	130	1.277	1.326	1.378	1.434	1.494	1.558	1.627	1.704	1.790	1.888	2.004	2.146	2.335	2.635	2.910	3.477
N=	140	1.269	1.318	1.370	1.426	1.485	1.549	1.619	1.695	1.781	1.878	1.994	2.135	2.324	2.622	2.896	3.462
N=	150	1.262	1.311	1.363	1.419	1.478	1.541	1.611	.687	1.772	1.870	1.985	2.126	2.314	2.611	2.884	3.448
N=	160	1.256	1.305	1.356	1.412	1.471	1.534	1.604	1.680	1.765	1.862	1.976	2.117	2.305	2.601	2.873	3.435
N=	170	1.250	1.299	1.351	1.406	1.465	1.528	1.597	1.673	1.758	1.855	1.969	2.110	2.297	2.592	2.863	3.424
N=	180	1.245	1.294	1.345	1.401	1.459	1.523	1.591	1.667	1.752	1.848	1.962	2.102	2.289	2.584	2.855	3.413
N=	190	1.240	1.289	1.340	1.396	1.454	1.517	1.586	1.662	1.746	1.843	1.956	2.096	2.282	2.577	2.846	3.404
N=	200	1.236	1.285	1.336	1.391	1.449	1.512	1.581	1.656	1.741	1.837	1.951	2.090	2.276	2.570	2.839	3.395
N=	250	1.219	1.267	1.318	1.373	1.431	1.493	1.561	1.636	1.720	1.815	1.928	2.066	2.251	2.542	2.809	3.360
N=	300	1.206	1.254	1.304	1.359	1.417	1.479	1.547	1.621	1.704	1.800	1.911	2.049	2.232	2.522	2.787	3.335
N=	400	1.188	1.236	1.286	1.340	1.398	1.460	1.527	1.601	1.683	1.778	1.889	2.025	2.207	2.494	2.757	3.300
N=	500	1.176	1.224	1.274	1.328	1.385	1.446	1.513	1.587	1.669	1.763	1.873	2.009	2.190	2.475	2.737	3.277
N=	600	1.168	1.215	1.265	1.319	1.376	1.437	1.503	1.577	1.659	1.752	1.862	1.997	2.178	2.462	2.722	3.260
N=	700	1.161	1.208	1.258	1.312	1.368	1.429	1.496	1.569	1.651	1.744	1.854	1.988	2.168	2.451	2.711	3.246
N=	800	1.156	1.203	1.252	1.306	1.363	1.424	1.490	1.563	1.644	1.737	1.847	1.981	2.160	2.443	2.702	3.236
N=	900	1.151	1.198	1.248	1.301	1.358	1.419	1.485	1.558	1.639	1.732	1.841	1.975	2.154	2.436	2.694	3.227
N=	1000	1.147	1.195	1.244	1.297	1.354	1.415	1.481	1.553	1.634	1.727	1.836	1.970	2.149	2.430	2.688	3.220
N=	9999	1.101	1.148	1.196	1.248	1.304	1.364	1.428	1.500	1.579	1.670	1.777	1.908	2.083	2.358	2.610	3.130
N=	50000	1.090	1.136	1.184	1.236	1.291	1.351	1.415	1.486	1.566	1.656	1.762	1.893	2.067	2.341	2.591	3.108

TABLE III

FACTORS OF ONE-SIDED TOLERANCE LIMITS FOR A NORMAL DISTRIBUTION

99% CONFIDENCE

Proportion of Population Covered ⟶

	.50	.51	.52	.53	.54	.55	.56	.57	.58	.59	.60	.61	.62	.63	.64	.65	.66	.67
N= 3	4.021	4.165	4.311	4.460	4.612	4.768	4.926	5.088	5.253	5.421	5.593	5.769	5.949	6.133	6.320	6.513	6.710	6.911
N= 4	2.270	2.347	2.425	2.505	2.586	2.668	2.752	2.837	2.924	3.012	3.102	3.194	3.287	3.383	3.480	3.580	3.681	3.785
N= 5	1.676	1.733	1.791	1.849	1.909	1.969	2.031	2.093	2.157	2.221	2.287	2.354	2.422	2.492	2.562	2.635	2.708	2.783
N= 6	1.374	1.422	1.470	1.519	1.569	1.620	1.671	1.723	1.776	1.830	1.884	1.940	1.997	2.054	2.113	2.172	2.233	2.296
N= 7	1.188	1.231	1.274	1.318	1.362	1.407	1.453	1.499	1.546	1.593	1.642	1.691	1.741	1.792	1.843	1.896	1.950	2.005
N= 8	1.060	1.099	1.139	1.180	1.221	1.262	1.304	1.346	1.389	1.433	1.478	1.523	1.568	1.615	1.662	1.711	1.760	1.810
N= 9	.965	1.003	1.040	1.078	1.117	1.156	1.195	1.235	1.275	1.316	1.358	1.400	1.443	1.487	1.531	1.576	1.622	1.669
N= 10	.892	.928	.964	1.000	1.037	1.074	1.111	1.149	1.188	1.227	1.267	1.307	1.347	1.389	1.431	1.474	1.518	1.562
N= 11	.833	.867	.901	.936	.972	1.007	1.043	1.080	1.117	1.154	1.192	1.231	1.270	1.310	1.350	1.391	1.433	1.476
N= 12	.784	.817	.850	.884	.918	.953	.988	1.023	1.059	1.096	1.132	1.170	1.208	1.246	1.285	1.325	1.365	1.406
N= 13	.743	.775	.808	.841	.874	.908	.942	.976	1.011	1.047	1.083	1.119	1.156	1.193	1.231	1.270	1.309	1.349
N= 14	.708	.739	.771	.804	.836	.869	.903	.937	.971	1.005	1.040	1.076	1.112	1.148	1.185	1.223	1.261	1.300
N= 15	.677	.708	.740	.772	.804	.836	.869	.902	.936	.969	1.004	1.039	1.074	1.110	1.146	1.183	1.220	1.259
N= 16	.650	.681	.712	.744	.775	.807	.839	.872	.905	.938	.972	1.006	1.041	1.076	1.112	1.148	1.185	1.222
N= 17	.627	.657	.688	.719	.750	.781	.813	.845	.878	.910	.944	.977	1.012	1.046	1.081	1.117	1.154	1.190
N= 18	.605	.635	.665	.696	.727	.758	.789	.821	.853	.885	.918	.951	.985	1.019	1.054	1.089	1.125	1.161
N= 19	.585	.615	.645	.675	.706	.737	.768	.799	.831	.863	.895	.928	.961	.995	1.029	1.064	1.099	1.135
N= 20	.568	.597	.627	.657	.687	.717	.748	.779	.810	.842	.874	.907	.940	.973	1.007	1.041	1.076	1.112
N= 21	.551	.581	.610	.640	.670	.700	.730	.761	.792	.823	.855	.887	.920	.953	.987	1.021	1.055	1.090
N= 22	.537	.566	.595	.624	.654	.684	.714	.744	.775	.806	.838	.870	.902	.935	.968	1.002	1.036	1.071
N= 23	.523	.552	.581	.610	.639	.669	.699	.729	.760	.791	.822	.854	.886	.918	.951	.984	1.018	1.053
N= 24	.510	.539	.568	.597	.626	.655	.685	.715	.746	.776	.807	.839	.870	.903	.935	.969	1.002	1.036
N= 25	.498	.527	.555	.584	.613	.643	.672	.702	.732	.763	.794	.825	.856	.888	.921	.954	.987	1.021
N= 26	.487	.516	.544	.573	.602	.631	.660	.690	.720	.750	.781	.812	.843	.875	.907	.940	.973	1.007
N= 27	.477	.505	.533	.562	.591	.620	.649	.679	.708	.739	.769	.800	.831	.863	.895	.927	.960	.994
N= 28	.467	.495	.523	.552	.581	.609	.639	.668	.698	.728	.758	.789	.820	.851	.883	.915	.948	.981
N= 29	.458	.486	.514	.542	.571	.600	.629	.658	.688	.717	.748	.778	.809	.840	.872	.904	.937	.970
N= 30	.449	.477	.505	.533	.562	.591	.619	.649	.678	.708	.738	.768	.799	.830	.862	.894	.926	.959
N= 31	.441	.469	.497	.525	.553	.582	.611	.640	.669	.699	.728	.759	.789	.820	.852	.884	.916	.949
N= 32	.434	.461	.489	.517	.545	.574	.602	.631	.660	.690	.720	.750	.780	.811	.842	.874	.906	.939
N= 33	.426	.454	.482	.509	.538	.566	.594	.623	.652	.682	.711	.741	.772	.803	.834	.865	.897	.930
N= 34	.419	.447	.474	.502	.530	.559	.587	.616	.645	.674	.704	.733	.764	.794	.825	.857	.889	.921
N= 35	.413	.440	.468	.495	.523	.551	.580	.608	.637	.667	.696	.726	.756	.787	.817	.849	.881	.913
N= 36	.406	.434	.461	.489	.517	.545	.573	.602	.630	.660	.689	.719	.749	.779	.810	.841	.873	.905
N= 37	.400	.427	.455	.483	.510	.538	.567	.595	.624	.653	.682	.712	.742	.772	.803	.834	.866	.898
N= 38	.394	.422	.449	.477	.504	.532	.560	.589	.617	.646	.676	.705	.735	.765	.796	.827	.858	.890
N= 39	.389	.416	.443	.471	.499	.526	.554	.583	.611	.640	.669	.699	.729	.759	.789	.820	.852	.884
N= 40	.384	.411	.438	.465	.493	.521	.549	.577	.606	.634	.663	.693	.722	.752	.783	.814	.845	.877
N= 41	.378	.405	.433	.460	.488	.515	.543	.571	.600	.629	.658	.687	.717	.747	.777	.808	.839	.871
N= 42	.374	.401	.428	.455	.482	.510	.538	.566	.595	.623	.652	.681	.711	.741	.771	.802	.833	.865
N= 43	.369	.396	.423	.450	.478	.505	.533	.561	.589	.618	.647	.676	.705	.735	.766	.796	.827	.859
N= 44	.364	.391	.418	.445	.473	.500	.528	.556	.584	.613	.642	.671	.700	.730	.760	.791	.822	.853
N= 45	.360	.387	.414	.441	.468	.496	.524	.551	.580	.608	.637	.666	.695	.725	.755	.786	.816	.848
N= 46	.356	.382	.409	.437	.464	.491	.519	.547	.575	.603	.632	.661	.690	.720	.750	.781	.811	.843
N= 47	.352	.378	.405	.432	.460	.487	.515	.543	.571	.599	.628	.656	.686	.715	.745	.776	.806	.838
N= 48	.348	.374	.401	.428	.455	.483	.510	.538	.566	.595	.623	.652	.681	.711	.741	.771	.802	.833
N= 49	.344	.371	.397	.424	.452	.479	.506	.534	.562	.590	.619	.648	.677	.706	.736	.766	.797	.828
N= 50	.340	.367	.394	.421	.448	.475	.502	.530	.558	.586	.615	.644	.673	.702	.732	.762	.793	.824
N= 55	.323	.350	.376	.403	.430	.457	.485	.512	.540	.568	.596	.625	.654	.683	.712	.742	.773	.803
N= 60	.309	.335	.362	.388	.415	.442	.469	.497	.524	.552	.580	.608	.637	.666	.696	.725	.755	.786
N= 65	.296	.322	.349	.375	.402	.429	.456	.483	.510	.538	.566	.594	.623	.652	.681	.710	.740	.771
N= 70	.285	.311	.337	.364	.390	.417	.444	.471	.498	.526	.554	.582	.610	.639	.668	.697	.727	.757
N= 75	.275	.301	.327	.353	.380	.406	.433	.460	.488	.515	.543	.571	.599	.627	.656	.686	.715	.745

N= 12	.784	.817	.850	.884	.918	.953	.988	1.023	1.059	1.096	1.132	1.170	1.208	1.246	1.285	1.325	1.365	1.406
N= 13	.743	.775	.808	.841	.874	.908	.942	.976	1.011	1.047	1.083	1.119	1.156	1.193	1.231	1.270	1.309	1.349
N= 14	.708	.739	.771	.804	.836	.869	.903	.937	.971	1.005	1.040	1.076	1.112	1.148	1.185	1.223	1.261	1.300
N= 15	.677	.708	.740	.772	.804	.836	.869	.902	.936	.969	1.004	1.039	1.074	1.110	1.146	1.183	1.220	1.259
N= 16	.650	.681	.712	.744	.775	.807	.839	.872	.905	.938	.972	1.006	1.041	1.076	1.112	1.148	1.185	1.222
N= 17	.627	.657	.688	.719	.750	.781	.813	.845	.878	.910	.944	.977	1.012	1.046	1.081	1.117	1.154	1.190
N= 18	.605	.635	.665	.696	.727	.758	.789	.821	.853	.885	.918	.951	.985	1.019	1.054	1.089	1.125	1.161
N= 19	.585	.615	.645	.675	.706	.737	.768	.799	.831	.863	.895	.928	.961	.995	1.029	1.064	1.099	1.135
N= 20	.568	.597	.627	.657	.687	.717	.748	.779	.810	.842	.874	.907	.940	.973	1.007	1.041	1.076	1.112
N= 21	.551	.581	.610	.640	.670	.700	.730	.761	.792	.823	.855	.887	.920	.953	.987	1.021	1.055	1.090
N= 22	.537	.566	.595	.624	.654	.684	.714	.744	.775	.806	.838	.870	.902	.935	.968	1.002	1.036	1.071
N= 23	.523	.552	.581	.610	.639	.669	.699	.729	.760	.791	.822	.854	.886	.918	.951	.984	1.018	1.053
N= 24	.510	.539	.568	.597	.626	.655	.685	.715	.746	.776	.807	.839	.870	.903	.935	.969	1.002	1.036
N= 25	.498	.527	.555	.584	.613	.643	.672	.702	.732	.763	.794	.825	.856	.888	.921	.954	.987	1.021
N= 26	.487	.516	.544	.573	.602	.631	.660	.690	.720	.750	.781	.812	.843	.875	.907	.940	.973	1.007
N= 27	.477	.505	.533	.562	.591	.621	.649	.679	.708	.739	.769	.800	.831	.863	.895	.927	.960	.994
N= 28	.467	.495	.523	.552	.581	.609	.639	.668	.698	.728	.758	.789	.820	.851	.883	.915	.948	.981
N= 29	.458	.486	.514	.542	.571	.600	.629	.658	.688	.717	.748	.778	.809	.840	.872	.904	.937	.970
N= 30	.449	.477	.505	.533	.562	.591	.619	.649	.678	.708	.738	.768	.799	.830	.862	.894	.926	.959
N= 31	.441	.469	.497	.525	.553	.582	.611	.640	.669	.699	.728	.759	.789	.820	.852	.884	.916	.949
N= 32	.434	.461	.489	.517	.545	.574	.602	.631	.660	.690	.720	.750	.780	.811	.842	.874	.906	.939
N= 33	.426	.454	.482	.509	.538	.566	.594	.623	.652	.682	.711	.741	.772	.803	.834	.865	.897	.930
N= 34	.419	.447	.474	.502	.530	.559	.587	.616	.645	.674	.704	.733	.764	.794	.825	.857	.889	.921
N= 35	.413	.440	.468	.495	.523	.551	.580	.608	.637	.667	.696	.726	.756	.787	.817	.849	.881	.913
N= 36	.406	.434	.461	.489	.517	.545	.573	.602	.630	.660	.689	.719	.749	.779	.810	.841	.873	.905
N= 37	.400	.427	.455	.483	.510	.538	.567	.595	.624	.653	.682	.712	.742	.772	.803	.834	.866	.898
N= 38	.394	.422	.449	.477	.504	.532	.560	.589	.617	.646	.676	.705	.735	.765	.796	.827	.858	.890
N= 39	.389	.416	.443	.471	.499	.526	.554	.583	.611	.640	.669	.699	.729	.759	.789	.820	.852	.884
N= 40	.384	.411	.438	.465	.493	.521	.549	.577	.606	.634	.663	.693	.722	.752	.783	.814	.845	.877
N= 41	.378	.405	.433	.460	.488	.515	.543	.571	.600	.629	.658	.687	.717	.747	.777	.808	.839	.871
N= 42	.374	.401	.428	.455	.482	.510	.538	.566	.595	.623	.652	.681	.711	.741	.771	.802	.833	.865
N= 43	.369	.396	.423	.450	.478	.505	.533	.561	.589	.618	.647	.676	.705	.735	.766	.796	.827	.859
N= 44	.364	.391	.418	.445	.473	.500	.528	.556	.584	.613	.642	.671	.700	.730	.760	.791	.822	.853
N= 45	.360	.387	.414	.441	.468	.496	.524	.551	.580	.608	.637	.666	.695	.725	.755	.786	.816	.846
N= 46	.356	.382	.409	.437	.464	.491	.519	.547	.575	.603	.632	.661	.690	.720	.750	.781	.811	.843
N= 47	.352	.378	.405	.432	.460	.487	.515	.543	.571	.599	.628	.656	.686	.715	.745	.776	.806	.838
N= 48	.348	.374	.401	.428	.455	.483	.510	.538	.566	.595	.623	.652	.681	.711	.741	.771	.802	.832
N= 49	.344	.371	.397	.424	.452	.479	.506	.534	.562	.590	.619	.648	.677	.706	.736	.766	.797	.828
N= 50	.340	.367	.394	.421	.448	.475	.502	.530	.558	.586	.615	.644	.673	.702	.732	.762	.793	.824
N= 55	.323	.350	.376	.403	.430	.457	.485	.512	.540	.568	.596	.625	.654	.683	.712	.742	.773	.803
N= 60	.309	.335	.362	.388	.415	.442	.469	.497	.524	.552	.580	.608	.637	.666	.696	.725	.755	.786
N= 65	.296	.322	.349	.375	.402	.429	.456	.483	.510	.538	.566	.594	.623	.652	.681	.710	.740	.771
N= 70	.285	.311	.337	.364	.390	.417	.444	.471	.498	.526	.554	.582	.610	.639	.668	.697	.727	.757
N= 75	.275	.301	.327	.353	.380	.406	.433	.460	.488	.515	.543	.571	.599	.627	.656	.686	.715	.745
N= 80	.265	.292	.318	.344	.370	.397	.424	.451	.478	.505	.533	.561	.589	.617	.646	.675	.705	.735
N= 85	.257	.283	.309	.336	.362	.388	.415	.442	.469	.496	.524	.552	.580	.608	.637	.666	.695	.725
N= 90	.250	.276	.302	.328	.354	.381	.407	.434	.461	.488	.516	.543	.571	.600	.628	.657	.687	.716
N= 95	.243	.269	.295	.321	.347	.373	.400	.427	.454	.481	.508	.536	.564	.592	.620	.649	.679	.708
N= 100	.236	.262	.288	.314	.341	.367	.393	.420	.447	.474	.501	.529	.557	.585	.613	.642	.671	.701
N= 110	.225	.251	.277	.303	.329	.355	.382	.408	.435	.462	.489	.516	.544	.572	.601	.629	.658	.688
N= 120	.215	.241	.267	.293	.319	.345	.371	.398	.424	.451	.478	.506	.533	.561	.590	.618	.647	.676
N= 130	.207	.232	.258	.284	.310	.336	.362	.389	.415	.442	.469	.496	.524	.552	.580	.608	.637	.666
N= 140	.199	.225	.250	.276	.302	.328	.354	.381	.407	.434	.461	.488	.516	.543	.571	.600	.629	.658
N= 150	.192	.218	.243	.269	.295	.321	.347	.373	.400	.427	.453	.481	.508	.536	.564	.592	.621	.650
N= 160	.186	.211	.237	.263	.289	.315	.341	.367	.393	.420	.447	.474	.501	.529	.557	.585	.614	.643
N= 170	.180	.206	.231	.257	.283	.309	.335	.361	.387	.414	.441	.468	.495	.523	.551	.579	.607	.636
N= 180	.175	.200	.226	.252	.277	.303	.329	.356	.382	.409	.435	.462	.490	.517	.545	.573	.602	.630
N= 190	.170	.196	.221	.247	.273	.299	.325	.351	.377	.404	.430	.457	.484	.512	.540	.568	.596	.625
N= 200	.166	.191	.217	.242	.268	.294	.320	.346	.372	.399	.426	.453	.480	.507	.535	.563	.591	.620
N= 250	.148	.173	.199	.224	.250	.276	.302	.328	.354	.380	.407	.434	.461	.488	.515	.543	.572	.600
N= 300	.135	.160	.186	.211	.237	.262	.288	.314	.340	.367	.393	.420	.447	.474	.501	.529	.557	.586
N= 400	.117	.142	.167	.193	.218	.244	.270	.295	.321	.347	.374	.400	.427	.454	.482	.509	.537	.565
N= 500	.104	.130	.155	.180	.206	.231	.257	.283	.308	.335	.361	.387	.414	.441	.468	.496	.524	.552
N= 600	.095	.120	.146	.171	.196	.222	.247	.273	.299	.325	.351	.378	.404	.431	.458	.486	.514	.542
N= 700	.088	.113	.139	.164	.189	.215	.240	.266	.292	.318	.344	.370	.397	.424	.451	.478	.506	.534
N= 800	.082	.108	.133	.158	.183	.209	.234	.260	.286	.312	.338	.364	.391	.418	.445	.472	.500	.528
N= 900	.078	.103	.128	.153	.179	.204	.230	.255	.281	.307	.333	.359	.386	.413	.440	.467	.495	.523
N= 1000	.074	.099	.124	.149	.175	.200	.225	.251	.277	.303	.329	.355	.382	.408	.435	.463	.490	.518
N= 9999	.023	.048	.073	.099	.124	.149	.174	.200	.225	.251	.277	.303	.329	.356	.383	.409	.437	.464
N=50000	.010	.035	.061	.086	.111	.136	.161	.187	.212	.238	.264	.290	.316	.343	.369	.396	.423	.451

TABLE III (Cont.)

FACTORS OF ONE-SIDED TOLERANCE LIMITS FOR A NORMAL DISTRIBUTION

99% CONFIDENCE

Proportion of Population Covered ⟶

	.68	.69	.70	.71	.72	.73	.74	.75	.76	.77	.78	.79	.80	.81	.82	.83	.84	.85
N= 3	7.118	7.329	7.547	7.770	7.999	8.235	8.478	8.728	8.986	9.253	9.529	9.815	10.111	10.419	10.740	11.075	11.426	11.795
N= 4	3.891	4.000	4.112	4.226	4.343	4.464	4.588	4.715	4.846	4.982	5.122	5.267	5.417	5.573	5.736	5.906	6.083	6.269
N= 5	2.860	2.939	3.019	3.102	3.186	3.273	3.362	3.454	3.548	3.646	3.746	3.850	3.958	4.070	4.186	4.308	4.435	4.568
N= 6	2.359	2.424	2.490	2.558	2.628	2.699	2.773	2.848	2.926	3.006	3.088	3.173	3.262	3.354	3.449	3.548	3.652	3.761
N= 7	2.061	2.118	2.176	2.236	2.297	2.360	2.424	2.491	2.559	2.629	2.701	2.776	2.854	2.934	3.018	3.105	3.196	3.291
N= 8	1.861	1.913	1.967	2.021	2.077	2.134	2.193	2.253	2.315	2.379	2.445	2.513	2.584	2.657	2.733	2.812	2.895	2.981
N= 9	1.717	1.766	1.816	1.867	1.919	1.972	2.027	2.083	2.141	2.200	2.262	2.325	2.391	2.459	2.530	2.603	2.680	2.761
N= 10	1.607	1.654	1.701	1.749	1.799	1.849	1.901	1.954	2.009	2.065	2.123	2.183	2.246	2.310	2.377	2.446	2.519	2.595
N= 11	1.519	1.563	1.609	1.655	1.702	1.751	1.800	1.851	1.903	1.957	2.013	2.070	2.129	2.191	2.255	2.321	2.391	2.463
N= 12	1.448	1.491	1.535	1.579	1.625	1.671	1.719	1.768	1.819	1.871	1.924	1.980	2.037	2.096	2.157	2.221	2.288	2.358
N= 13	1.390	1.431	1.473	1.517	1.561	1.606	1.653	1.700	1.749	1.800	1.852	1.905	1.960	2.018	2.077	2.139	2.204	2.272
N= 14	1.340	1.381	1.422	1.464	1.507	1.551	1.597	1.643	1.691	1.740	1.790	1.843	1.896	1.952	2.010	2.071	2.134	2.200
N= 15	1.298	1.337	1.378	1.419	1.461	1.504	1.549	1.594	1.641	1.689	1.738	1.789	1.842	1.896	1.953	2.012	2.074	2.138
N= 16	1.261	1.300	1.339	1.380	1.421	1.464	1.507	1.552	1.597	1.644	1.693	1.743	1.794	1.848	1.903	1.961	2.021	2.085
N= 17	1.228	1.266	1.305	1.345	1.386	1.428	1.470	1.514	1.559	1.605	1.653	1.702	1.753	1.805	1.860	1.917	1.976	2.038
N= 18	1.198	1.236	1.275	1.314	1.354	1.395	1.437	1.480	1.524	1.570	1.617	1.665	1.715	1.767	1.820	1.876	1.934	1.995
N= 19	1.172	1.209	1.247	1.286	1.325	1.366	1.407	1.450	1.493	1.538	1.584	1.632	1.681	1.732	1.785	1.840	1.898	1.958
N= 20	1.148	1.185	1.222	1.260	1.300	1.340	1.381	1.422	1.466	1.510	1.555	1.602	1.651	1.701	1.754	1.808	1.864	1.924
N= 21	1.126	1.162	1.200	1.237	1.276	1.316	1.356	1.398	1.440	1.484	1.529	1.576	1.624	1.673	1.725	1.779	1.835	1.893
N= 22	1.106	1.142	1.179	1.217	1.255	1.294	1.334	1.375	1.417	1.461	1.505	1.551	1.599	1.648	1.699	1.752	1.807	1.865
N= 23	1.088	1.124	1.160	1.197	1.235	1.274	1.314	1.355	1.396	1.439	1.483	1.529	1.576	1.625	1.675	1.728	1.783	1.840
N= 24	1.071	1.107	1.143	1.180	1.217	1.256	1.295	1.336	1.377	1.420	1.463	1.508	1.555	1.603	1.653	1.705	1.760	1.816
N= 25	1.056	1.091	1.127	1.163	1.201	1.239	1.278	1.318	1.359	1.401	1.445	1.490	1.536	1.584	1.633	1.685	1.739	1.795
N= 26	1.041	1.076	1.112	1.148	1.185	1.223	1.262	1.302	1.343	1.384	1.428	1.472	1.518	1.565	1.615	1.666	1.719	1.775
N= 27	1.028	1.063	1.098	1.134	1.171	1.209	1.247	1.287	1.327	1.369	1.412	1.456	1.501	1.548	1.597	1.648	1.701	1.756
N= 28	1.015	1.050	1.085	1.121	1.158	1.195	1.233	1.273	1.313	1.354	1.397	1.440	1.486	1.533	1.581	1.632	1.684	1.739
N= 29	1.004	1.038	1.073	1.109	1.145	1.182	1.220	1.259	1.299	1.340	1.383	1.426	1.471	1.518	1.566	1.616	1.668	1.723
N= 30	.993	1.027	1.062	1.097	1.133	1.170	1.208	1.247	1.287	1.328	1.370	1.413	1.458	1.504	1.552	1.602	1.654	1.708
N= 31	.982	1.016	1.051	1.086	1.122	1.159	1.197	1.235	1.275	1.315	1.357	1.400	1.445	1.491	1.538	1.588	1.640	1.694
N= 32	.972	1.006	1.041	1.076	1.112	1.148	1.186	1.224	1.264	1.304	1.346	1.388	1.433	1.478	1.526	1.575	1.627	1.680
N= 33	.963	.997	1.031	1.066	1.102	1.138	1.176	1.214	1.253	1.293	1.335	1.377	1.421	1.467	1.514	1.563	1.614	1.668
N= 34	.954	.988	1.022	1.057	1.092	1.129	1.166	1.204	1.243	1.283	1.324	1.367	1.410	1.456	1.503	1.552	1.602	1.656
N= 35	.946	.979	1.013	1.048	1.083	1.120	1.157	1.195	1.233	1.273	1.314	1.357	1.400	1.445	1.492	1.541	1.591	1.644
N= 36	.938	.971	1.005	1.040	1.075	1.111	1.148	1.186	1.224	1.264	1.305	1.347	1.390	1.435	1.482	1.530	1.581	1.634
N= 37	.930	.964	.997	1.032	1.067	1.103	1.140	1.177	1.216	1.255	1.296	1.338	1.381	1.426	1.472	1.521	1.571	1.623
N= 38	.923	.956	.990	1.024	1.059	1.095	1.132	1.169	1.207	1.247	1.287	1.329	1.372	1.417	1.463	1.511	1.561	1.613
N= 39	.916	.949	.983	1.017	1.052	1.087	1.124	1.161	1.199	1.239	1.279	1.321	1.364	1.408	1.454	1.502	1.552	1.604
N= 40	.909	.942	.976	1.010	1.045	1.080	1.117	1.154	1.192	1.231	1.271	1.313	1.356	1.400	1.446	1.493	1.543	1.595
N= 41	.903	.936	.969	1.003	1.038	1.073	1.109	1.147	1.185	1.224	1.264	1.305	1.348	1.392	1.438	1.485	1.535	1.586
N= 42	.897	.929	.963	.997	1.031	1.067	1.103	1.140	1.178	1.217	1.257	1.298	1.340	1.384	1.430	1.477	1.527	1.578
N= 43	.891	.924	.957	.991	1.025	1.060	1.096	1.133	1.171	1.210	1.250	1.291	1.333	1.377	1.422	1.470	1.519	1.570
N= 44	.885	.918	.951	.985	1.019	1.054	1.090	1.127	1.165	1.203	1.243	1.284	1.326	1.370	1.415	1.462	1.511	1.563
N= 45	.880	.912	.945	.979	1.013	1.048	1.084	1.121	1.158	1.197	1.237	1.278	1.320	1.363	1.409	1.455	1.504	1.555
N= 46	.875	.907	.940	.973	1.008	1.043	1.078	1.115	1.153	1.191	1.231	1.271	1.313	1.357	1.402	1.449	1.497	1.548
N= 47	.870	.902	.935	.968	1.002	1.037	1.073	1.109	1.147	1.185	1.225	1.265	1.307	1.351	1.396	1.442	1.491	1.542
N= 48	.865	.897	.930	.963	.997	1.032	1.068	1.104	1.141	1.180	1.219	1.260	1.301	1.345	1.389	1.436	1.485	1.535
N= 49	.860	.892	.925	.958	.992	1.027	1.062	1.099	1.136	1.174	1.214	1.254	1.296	1.339	1.384	1.430	1.478	1.529
N= 50	.855	.888	.920	.953	.987	1.022	1.057	1.094	1.131	1.169	1.208	1.249	1.290	1.333	1.378	1.424	1.472	1.523
N= 55	.835	.867	.899	.932	.966	1.000	1.035	1.071	1.108	1.145	1.184	1.224	1.265	1.308	1.352	1.398	1.446	1.496
N= 60	.817	.849	.881	.914	.947	.981	1.016	1.051	1.088	1.125	1.164	1.203	1.244	1.286	1.330	1.376	1.423	1.472
N= 65	.802	.833	.865	.897	.931	.964	.999	1.034	1.071	1.108	1.146	1.185	1.226	1.268	1.311	1.356	1.403	1.452
N= 70	.788	.819	.851	.883	.916	.950	.984	1.019	1.055	1.092	1.130	1.169	1.210	1.251	1.294	1.339	1.386	1.434
N= 75	.776	.807	.839	.871	.904	.937	.971	1.006	1.042	1.079	1.116	1.155	1.195	1.237	1.280	1.324	1.370	1.419
N= 80	.765	.796	.828	.860	.892	.926	.960	.994	1.030	1.066	1.104	1.143	1.183	1.224	1.266	1.311	1.357	1.405

N=	13	1.340	1.381	1.422	1.464	1.507	1.551	1.597	1.643	1.691	1.740	1.790	1.843	1.896	1.952	2.010	2.071	2.134	2.200
N=	14	1.298	1.337	1.378	1.419	1.461	1.504	1.549	1.594	1.641	1.689	1.738	1.789	1.842	1.896	1.953	2.012	2.074	2.138
N=	15	1.261	1.300	1.339	1.380	1.421	1.464	1.507	1.552	1.597	1.644	1.693	1.743	1.794	1.848	1.903	1.961	2.021	2.085
N=	16	1.228	1.266	1.305	1.345	1.386	1.428	1.470	1.514	1.559	1.605	1.653	1.702	1.753	1.805	1.860	1.917	1.976	2.038
N=	17	1.198	1.236	1.275	1.314	1.354	1.395	1.437	1.480	1.524	1.570	1.617	1.665	1.715	1.767	1.820	1.876	1.934	1.995
N=	18	1.172	1.209	1.247	1.286	1.325	1.366	1.407	1.450	1.493	1.538	1.584	1.632	1.681	1.732	1.785	1.840	1.898	1.958
N=	19	1.148	1.185	1.222	1.260	1.300	1.340	1.381	1.422	1.466	1.510	1.555	1.602	1.651	1.701	1.754	1.808	1.864	1.924
N=	20	1.126	1.162	1.200	1.237	1.276	1.316	1.356	1.398	1.440	1.484	1.529	1.576	1.624	1.673	1.725	1.779	1.835	1.893
N=	21	1.106	1.142	1.179	1.217	1.255	1.294	1.334	1.375	1.417	1.461	1.505	1.551	1.599	1.648	1.699	1.752	1.807	1.865
N=	22	1.088	1.124	1.160	1.197	1.235	1.274	1.314	1.355	1.396	1.439	1.483	1.529	1.576	1.625	1.675	1.728	1.783	1.840
N=	23	1.071	1.107	1.143	1.180	1.217	1.256	1.295	1.336	1.377	1.420	1.463	1.508	1.555	1.603	1.653	1.705	1.760	1.816
N=	24	1.056	1.091	1.127	1.163	1.201	1.239	1.278	1.318	1.359	1.401	1.445	1.490	1.536	1.584	1.633	1.685	1.739	1.795
N=	25	1.041	1.076	1.112	1.148	1.185	1.223	1.262	1.302	1.343	1.384	1.428	1.472	1.518	1.565	1.615	1.666	1.719	1.775
N=	26	1.028	1.063	1.098	1.134	1.171	1.209	1.247	1.287	1.327	1.369	1.412	1.456	1.501	1.548	1.597	1.648	1.701	1.756
N=	27	1.015	1.050	1.085	1.121	1.158	1.195	1.233	1.273	1.313	1.354	1.397	1.440	1.486	1.533	1.581	1.632	1.684	1.739
N=	28	1.004	1.038	1.073	1.109	1.145	1.182	1.220	1.259	1.299	1.340	1.383	1.426	1.471	1.518	1.566	1.616	1.668	1.723
N=	30	.993	1.027	1.062	1.097	1.133	1.170	1.208	1.247	1.287	1.328	1.370	1.413	1.458	1.504	1.552	1.602	1.654	1.708
N=	31	.982	1.016	1.051	1.086	1.122	1.159	1.197	1.235	1.275	1.315	1.357	1.400	1.445	1.491	1.538	1.588	1.640	1.694
N=	32	.972	1.006	1.041	1.076	1.112	1.148	1.186	1.224	1.264	1.304	1.346	1.388	1.433	1.478	1.526	1.575	1.627	1.680
N=	33	.963	.997	1.031	1.066	1.102	1.138	1.176	1.214	1.253	1.293	1.335	1.377	1.421	1.467	1.514	1.563	1.614	1.668
N=	34	.954	.988	1.022	1.057	1.092	1.129	1.166	1.204	1.243	1.283	1.324	1.367	1.410	1.456	1.503	1.552	1.602	1.656
N=	35	.946	.979	1.013	1.048	1.083	1.120	1.157	1.195	1.233	1.273	1.314	1.357	1.400	1.445	1.492	1.541	1.591	1.644
N=	36	.938	.971	1.005	1.040	1.075	1.111	1.148	1.186	1.224	1.264	1.305	1.347	1.390	1.435	1.482	1.530	1.581	1.634
N=	37	.930	.964	.997	1.032	1.067	1.103	1.140	1.177	1.216	1.255	1.296	1.338	1.381	1.426	1.472	1.521	1.571	1.623
N=	38	.923	.956	.990	1.024	1.059	1.095	1.132	1.169	1.207	1.247	1.287	1.329	1.372	1.417	1.463	1.511	1.561	1.613
N=	39	.916	.949	.983	1.017	1.052	1.087	1.124	1.161	1.199	1.239	1.279	1.321	1.364	1.408	1.454	1.502	1.552	1.604
N=	40	.909	.942	.976	1.010	1.045	1.080	1.117	1.154	1.192	1.231	1.271	1.313	1.356	1.400	1.446	1.493	1.543	1.595
N=	41	.903	.936	.969	1.003	1.038	1.073	1.109	1.147	1.185	1.224	1.264	1.305	1.348	1.392	1.438	1.485	1.535	1.586
N=	42	.897	.929	.963	.997	1.031	1.067	1.103	1.140	1.178	1.217	1.257	1.298	1.340	1.384	1.430	1.477	1.527	1.578
N=	43	.891	.924	.957	.991	1.025	1.060	1.096	1.133	1.171	1.210	1.250	1.291	1.333	1.377	1.422	1.470	1.519	1.570
N=	44	.885	.918	.951	.985	1.019	1.054	1.090	1.127	1.165	1.203	1.243	1.284	1.326	1.370	1.415	1.462	1.511	1.563
N=	45	.880	.912	.945	.979	1.013	1.048	1.084	1.121	1.158	1.197	1.237	1.278	1.320	1.363	1.409	1.455	1.504	1.555
N=	46	.875	.907	.940	.973	1.008	1.043	1.078	1.115	1.153	1.191	1.231	1.271	1.313	1.357	1.402	1.449	1.497	1.548
N=	47	.870	.902	.935	.968	1.002	1.037	1.073	1.109	1.147	1.185	1.225	1.265	1.307	1.351	1.396	1.442	1.491	1.542
N=	48	.865	.897	.930	.963	.997	1.032	1.068	1.104	1.141	1.180	1.219	1.260	1.301	1.345	1.389	1.436	1.485	1.535
N=	49	.860	.892	.925	.958	.992	1.027	1.062	1.099	1.136	1.174	1.214	1.254	1.296	1.339	1.384	1.430	1.478	1.529
N=	50	.855	.888	.920	.953	.987	1.022	1.057	1.094	1.131	1.169	1.208	1.249	1.290	1.333	1.378	1.424	1.472	1.523
N=	55	.835	.867	.899	.932	.966	1.000	1.035	1.071	1.108	1.145	1.184	1.224	1.265	1.308	1.352	1.398	1.446	1.496
N=	60	.817	.849	.881	.914	.947	.981	1.016	1.051	1.088	1.125	1.164	1.203	1.244	1.286	1.330	1.376	1.423	1.472
N=	65	.802	.833	.865	.897	.931	.964	.999	1.034	1.071	1.108	1.146	1.185	1.226	1.268	1.311	1.356	1.403	1.452
N=	70	.788	.819	.851	.883	.916	.950	.984	1.019	1.055	1.092	1.130	1.169	1.210	1.251	1.294	1.339	1.386	1.434
N=	75	.776	.807	.839	.871	.904	.937	.971	1.006	1.042	1.079	1.116	1.155	1.195	1.237	1.280	1.324	1.370	1.419
N=	80	.765	.796	.828	.860	.892	.926	.960	.994	1.030	1.066	1.104	1.143	1.183	1.224	1.266	1.311	1.357	1.405
N=	85	.755	.786	.818	.849	.882	.915	.949	.984	1.019	1.055	1.093	1.131	1.171	1.212	1.254	1.298	1.344	1.392
N=	90	.747	.777	.808	.840	.873	.906	.939	.974	1.009	1.045	1.083	1.121	1.160	1.201	1.243	1.287	1.333	1.381
N=	95	.738	.769	.800	.832	.864	.897	.931	.965	1.000	1.036	1.073	1.112	1.151	1.192	1.234	1.277	1.323	1.370
N=	100	.731	.761	.792	.824	.856	.889	.923	.957	.992	1.028	1.065	1.103	1.142	1.183	1.225	1.268	1.313	1.361
N=	110	.718	.748	.779	.810	.842	.875	.908	.942	.977	1.013	1.050	1.088	1.127	1.167	1.208	1.252	1.297	1.344
N=	120	.706	.736	.767	.798	.830	.863	.896	.930	.965	1.000	1.037	1.074	1.113	1.153	1.195	1.239	1.282	1.329
N=	130	.696	.726	.757	.788	.820	.852	.885	.919	.954	.989	1.025	1.063	1.101	1.141	1.182	1.225	1.270	1.316
N=	140	.687	.717	.748	.779	.810	.843	.876	.909	.944	.979	1.015	1.053	1.091	1.131	1.172	1.214	1.259	1.305
N=	150	.679	.709	.740	.771	.802	.834	.867	.901	.935	.970	1.006	1.043	1.082	1.121	1.162	1.205	1.249	1.295
N=	160	.672	.702	.732	.763	.795	.827	.859	.893	.927	.962	.998	1.035	1.073	1.113	1.154	1.196	1.240	1.286
N=	170	.666	.695	.726	.757	.788	.820	.853	.886	.920	.955	.991	1.028	1.066	1.105	1.146	1.188	1.232	1.278
N=	180	.660	.689	.720	.750	.782	.814	.846	.879	.914	.948	.984	1.021	1.059	1.098	1.139	1.181	1.225	1.270
N=	190	.654	.684	.714	.745	.776	.808	.840	.874	.908	.942	.978	1.015	1.053	1.092	1.132	1.174	1.218	1.263
N=	200	.649	.679	.709	.740	.771	.803	.835	.868	.902	.937	.973	1.009	1.047	1.086	1.126	1.168	1.212	1.257
N=	250	.629	.659	.689	.719	.750	.781	.814	.846	.880	.915	.950	.986	1.024	1.062	1.102	1.144	1.187	1.232
N=	300	.615	.644	.674	.704	.735	.766	.798	.831	.864	.898	.934	.970	1.007	1.045	1.085	1.126	1.169	1.214
N=	400	.594	.623	.653	.683	.713	.745	.776	.809	.842	.876	.911	.947	.984	1.022	1.061	1.102	1.144	1.189
N=	500	.580	.609	.639	.669	.699	.730	.762	.794	.827	.861	.896	.931	.968	1.006	1.045	1.086	1.128	1.172
N=	600	.570	.599	.628	.658	.689	.720	.751	.783	.816	.850	.884	.920	.956	.994	1.033	1.074	1.116	1.159
N=	700	.563	.591	.621	.650	.681	.711	.743	.775	.806	.841	.876	.911	.948	.985	1.024	1.064	1.106	1.150
N=	800	.556	.585	.614	.644	.674	.705	.736	.768	.801	.834	.869	.904	.940	.978	1.017	1.057	1.099	1.142
N=	900	.551	.580	.609	.639	.669	.699	.731	.763	.795	.829	.863	.898	.935	.972	1.011	1.051	1.093	1.136
N=	1000	.547	.575	.604	.634	.664	.695	.726	.758	.791	.824	.858	.894	.930	.967	1.006	1.046	1.087	1.131
N=	9999	.492	.521	.549	.578	.608	.638	.669	.700	.732	.765	.799	.833	.869	.905	.943	.982	1.023	1.066
N=50000		.479	.507	.535	.565	.594	.624	.655	.686	.718	.751	.784	.818	.854	.890	.928	.967	1.007	1.049

TABLE III (Cont.)

FACTORS OF ONE-SIDED TOLERANCE LIMITS FOR A NORMAL DISTRIBUTION

99% CONFIDENCE

Proportion of Population Covered ⟶

	.86	.87	.88	.89	.90	.91	.92	.93	.94	.95	.96	.97	.98	.99	.995	.999
N= 3	12.183	12.593	13.025	13.495	13.995	14.538	15.131	15.786	16.524	17.370	18.371	19.609	21.265	23.896	26.319	31.348
N= 4	6.465	6.672	6.890	7.127	7.380	7.653	7.953	8.284	8.656	9.083	9.589	10.215	11.054	12.387	13.618	16.176
N= 5	4.708	4.856	5.012	5.181	5.362	5.557	5.771	6.007	6.273	6.578	6.939	7.387	7.980	8.939	9.819	11.649
N= 6	3.876	3.997	4.125	4.263	4.411	4.571	4.745	4.939	5.156	5.405	5.701	6.066	6.556	7.335	8.054	9.550
N= 7	3.391	3.497	3.609	3.730	3.859	3.999	4.151	4.320	4.510	4.728	4.985	5.304	5.732	6.412	7.040	8.346
N= 8	3.073	3.169	3.270	3.380	3.497	3.624	3.762	3.916	4.088	4.285	4.519	4.808	5.195	5.812	6.381	7.564
N= 9	2.846	2.935	3.029	3.132	3.240	3.358	3.487	3.629	3.789	3.972	4.189	4.457	4.817	5.389	5.917	7.014
N= 10	2.675	2.760	2.849	2.945	3.048	3.159	3.280	3.415	3.565	3.738	3.943	4.196	4.535	5.074	5.571	6.605
N= 11	2.540	2.621	2.705	2.797	2.895	3.001	3.117	3.245	3.389	3.554	3.749	3.990	4.313	4.826	5.300	6.285
N= 12	2.432	2.509	2.591	2.680	2.774	2.876	2.987	3.110	3.248	3.407	3.594	3.826	4.136	4.629	5.084	6.030
N= 13	2.343	2.418	2.497	2.583	2.674	2.773	2.881	3.000	3.133	3.287	3.468	3.692	3.992	4.468	4.908	5.822
N= 14	2.269	2.342	2.419	2.502	2.[illegible]	2.687	2.791	2.907	3.037	3.186	3.362	3.580	3.871	4.334	4.761	5.649
N= 15	2.206	2.277	2.352	2.433	2.520	2.614	2.716	2.829	2.955	3.101	3.272	3.485	3.769	4.220	4.637	5.502
N= 16	2.151	2.221	2.294	2.374	2.459	2.550	2.650	2.761	2.885	3.027	3.195	3.403	3.681	4.122	4.529	5.375
N= 17	2.103	2.172	2.244	2.322	2.405	2.495	2.593	2.701	2.823	2.963	3.127	3.331	3.604	4.037	4.436	5.265
N= 18	2.059	2.127	2.198	2.275	2.356	2.445	2.541	2.648	2.767	2.905	3.066	3.267	3.534	3.960	4.352	5.166
N= 19	2.021	2.087	2.157	2.233	2.313	2.400	2.495	2.600	2.718	2.853	3.012	3.209	3.473	3.891	4.277	5.078
N= 20	1.986	2.052	2.120	2.195	2.275	2.360	2.454	2.557	2.674	2.807	2.964	3.158	3.418	3.830	4.210	5.000
N= 21	1.955	2.019	2.087	2.16[illegible]	2.240	2.324	2.417	2.519	2.634	2.765	2.920	3.112	3.368	3.775	4.150	4.929
N= 22	1.926	1.990	2.057	2.130	2.208	2.292	2.383	2.484	2.597	2.727	2.880	3.070	3.323	3.725	4.096	4.865
N= 23	1.900	1.963	2.030	2.102	2.179	2.262	2.352	2.452	2.564	2.693	2.844	3.032	3.282	3.680	4.046	4.806
N= 24	1.876	1.939	2.005	2.076	2.152	2.234	2.324	2.423	2.534	2.661	2.811	2.997	3.244	3.638	4.000	4.753
N= 25	1.854	1.916	1.982	2.053	2.128	2.209	2.298	2.396	2.506	2.632	2.781	2.964	3.210	3.600	3.959	4.704
N= 26	1.834	1.895	1.960	2.031	2.105	2.186	2.274	2.371	2.480	2.605	2.752	2.934	3.178	3.564	3.920	4.658
N= 27	1.815	1.876	1.940	2.010	2.084	2.164	2.252	2.348	2.456	2.580	2.726	2.907	3.148	3.531	3.884	4.616
N= 28	1.797	1.858	1.922	1.991	2.065	2.144	2.231	2.326	2.434	2.557	2.702	2.881	3.121	3.501	3.851	4.577
N= 29	1.780	1.841	1.904	1.973	2.046	2.125	2.211	2.306	2.413	2.535	2.679	2.857	3.095	3.472	3.820	4.541
N= 30	1.765	1.825	1.888	1.957	2.029	2.108	2.193	2.288	2.393	2.515	2.658	2.835	3.071	3.446	3.791	4.507
N= 31	1.750	1.810	1.873	1.941	2.013	2.091	2.176	2.270	2.375	2.496	2.638	2.813	3.048	3.421	3.763	4.475
N= 32	1.737	1.796	1.858	1.926	1.998	2.075	2.160	2.253	2.358	2.478	2.619	2.794	3.027	3.397	3.738	4.445
N= 33	1.724	1.783	1.845	1.912	1.984	2.061	2.145	2.238	2.342	2.461	2.601	2.775	3.007	3.375	3.714	4.416
N= 34	1.712	1.770	1.832	1.899	1.970	2.047	2.130	2.223	2.326	2.445	2.585	2.757	2.988	3.354	3.691	4.389
N= 35	1.700	1.759	1.820	1.886	1.957	2.034	2.117	2.209	2.312	2.430	2.569	2.741	2.970	3.334	3.669	4.364
N= 36	1.689	1.747	1.808	1.875	1.945	2.021	2.104	2.195	2.298	2.415	2.554	2.725	2.953	3.315	3.649	4.340
N= 37	1.678	1.737	1.797	1.863	1.933	2.009	2.092	2.183	2.285	2.402	2.539	2.710	2.937	3.297	3.629	4.317
N= 38	1.668	1.726	1.787	1.853	1.922	1.998	2.080	2.170	2.272	2.388	2.526	2.695	2.921	3.280	3.610	4.295
N= 39	1.659	1.716	1.777	1.842	1.912	1.987	2.069	2.159	2.260	2.376	2.512	2.681	2.907	3.264	3.593	4.275
N= 40	1.650	1.707	1.767	1.832	1.902	1.976	2.058	2.148	2.248	2.364	2.500	2.668	2.892	3.248	3.576	4.255
N= 41	1.641	1.698	1.758	1.823	1.892	1.966	2.047	2.137	2.237	2.352	2.488	2.655	2.879	3.233	3.559	4.236
N= 42	1.632	1.689	1.749	1.814	1.883	1.957	2.038	2.127	2.227	2.341	2.477	2.643	2.866	3.219	3.544	4.217
N= 43	1.624	1.681	1.741	1.805	1.874	1.948	2.028	2.117	2.217	2.331	2.466	2.632	2.854	3.205	3.529	4.200
N= 44	1.616	1.673	1.732	1.797	1.865	1.939	2.019	2.108	2.207	2.321	2.455	2.621	2.842	3.192	3.515	4.183
N= 45	1.609	1.666	1.725	1.789	1.857	1.930	2.011	2.099	2.198	2.311	2.445	2.610	2.831	3.180	3.501	4.167
N= 46	1.602	1.658	1.717	1.781	1.849	1.922	2.002	2.090	2.189	2.302	2.435	2.600	2.820	3.168	3.488	4.152
N= 47	1.595	1.651	1.710	1.774	1.841	1.915	1.994	2.082	2.180	2.293	2.426	2.590	2.809	3.156	3.475	4.137
N= 48	1.588	1.644	1.703	1.767	1.834	1.907	1.986	2.074	2.172	2.285	2.417	2.581	2.799	3.145	3.463	4.123
N= 49	1.582	1.638	1.696	1.760	1.827	1.900	1.979	2.066	2.164	2.276	2.408	2.572	2.789	3.134	3.452	4.110
N= 50	1.576	1.632	1.690	1.753	1.820	1.893	1.972	2.059	2.157	2.268	2.400	2.563	2.780	3.124	3.440	4.096
N= 55	1.548	1.603	1.661	1.723	1.790	1.861	1.939	2.026	2.122	2.232	2.363	2.523	2.738	3.077	3.390	4.037
N= 60	1.524	1.579	1.636	1.698	1.764	1.835	1.912	1.997	2.093	2.202	2.331	2.490	2.702	3.038	3.347	3.987
N= 65	1.504	1.558	1.614	1.676	1.741	1.811	1.888	1.972	2.067	2.175	2.303	2.460	2.671	3.003	3.309	3.943
N= 70	1.485	1.539	1.595	1.656	1.721	1.791	1.867	1.951	2.045	2.152	2.279	2.435	2.643	2.973	3.277	3.905
N= 75	1.469	1.523	1.579	1.639	1.704	1.773	1.848	1.932	2.025	2.132	2.257	2.412	2.619	2.947	3.248	3.871
N= 80	1.455	1.508	1.564	1.624	1.688	1.757	1.832	1.915	2.007	2.113	2.238	2.392	2.598	2.923	3.222	3.841
N= 85	1.442	1.495	1.550	1.610	1.674	1.742	1.817	1.899	1.991	2.097	2.221	2.374	2.579	2.902	3.199	3.815
N= 90	1.431	1.483	1.538	1.598	1.661	1.729	1.804	1.885	1.977	2.082	2.206	2.358	2.561	2.883	3.178	3.790
N= 95	1.420	1.472	1.527	1.586	1.649	1.717	1.791	1.873	1.964	2.068	2.191	2.343	2.545	2.865	3.159	3.768
N= 100	1.410	1.462	1.517	1.576	1.639	1.706	1.780	1.861	1.952	2.056	2.178	2.329	2.531	2.849	3.142	3.748

N=	18	2.059	2.127	2.198	2.275	2.356	2.445	2.541	2.648	2.767	2.905	3.066	3.267	3.534	3.960	4.352	5.166
N=	19	2.021	2.087	2.157	2.233	2.313	2.400	2.495	2.600	2.718	2.853	3.012	3.209	3.473	3.891	4.277	5.078
N=	20	1.986	2.052	2.120	2.195	2.275	2.360	2.454	2.557	2.674	2.807	2.964	3.158	3.418	3.830	4.210	5.000
N=	21	1.955	2.019	2.087	2.161	2.240	2.324	2.417	2.519	2.634	2.765	2.920	3.112	3.368	3.775	4.150	4.929
N=	22	1.926	1.990	2.057	2.130	2.208	2.292	2.383	2.484	2.597	2.727	2.880	3.070	3.323	3.725	4.096	4.865
N=	23	1.900	1.963	2.030	2.102	2.179	2.262	2.352	2.452	2.564	2.693	2.844	3.032	3.282	3.680	4.046	4.806
N=	24	1.876	1.939	2.005	2.076	2.152	2.234	2.324	2.423	2.534	2.661	2.811	2.997	3.244	3.638	4.000	4.753
N=	25	1.854	1.916	1.982	2.053	2.128	2.209	2.298	2.396	2.506	2.632	2.781	2.964	3.210	3.600	3.959	4.704
N=	26	1.834	1.895	1.960	2.031	2.105	2.186	2.274	2.371	2.480	2.605	2.752	2.934	3.178	3.564	3.920	4.658
N=	27	1.815	1.876	1.940	2.010	2.084	2.164	2.252	2.348	2.456	2.580	2.726	2.907	3.148	3.531	3.884	4.616
N=	28	1.797	1.858	1.922	1.991	2.065	2.144	2.231	2.326	2.434	2.557	2.702	2.881	3.121	3.501	3.851	4.577
N=	29	1.780	1.841	1.904	1.973	2.046	2.125	2.211	2.306	2.413	2.535	2.679	2.857	3.095	3.472	3.820	4.541
N=	30	1.765	1.825	1.888	1.957	2.029	2.108	2.193	2.288	2.393	2.515	2.658	2.835	3.071	3.446	3.791	4.507
N=	31	1.750	1.810	1.873	1.941	2.013	2.091	2.176	2.270	2.375	2.496	2.638	2.813	3.048	3.421	3.763	4.475
N=	32	1.737	1.796	1.858	1.926	1.998	2.075	2.160	2.253	2.358	2.478	2.619	2.794	3.027	3.397	3.738	4.445
N=	33	1.724	1.783	1.845	1.912	1.984	2.061	2.145	2.238	2.342	2.461	2.601	2.775	3.007	3.375	3.714	4.416
N=	34	1.712	1.770	1.832	1.899	1.970	2.047	2.130	2.223	2.326	2.445	2.585	2.757	2.988	3.354	3.691	4.389
N=	35	1.700	1.759	1.820	1.886	1.957	2.034	2.117	2.209	2.312	2.430	2.569	2.741	2.970	3.334	3.669	4.364
N=	36	1.689	1.747	1.808	1.875	1.945	2.021	2.104	2.195	2.298	2.415	2.554	2.725	2.953	3.315	3.649	4.340
N=	37	1.678	1.737	1.797	1.863	1.933	2.009	2.092	2.183	2.285	2.402	2.539	2.710	2.937	3.297	3.629	4.317
N=	38	1.668	1.726	1.787	1.853	1.922	1.998	2.080	2.170	2.272	2.388	2.526	2.695	2.921	3.280	3.610	4.295
N=	39	1.659	1.716	1.777	1.842	1.912	1.987	2.069	2.159	2.260	2.376	2.512	2.681	2.907	3.264	3.593	4.275
N=	40	1.650	1.707	1.767	1.832	1.902	1.976	2.058	2.148	2.248	2.364	2.500	2.668	2.892	3.248	3.576	4.255
N=	41	1.641	1.698	1.758	1.823	1.892	1.966	2.047	2.137	2.237	2.352	2.488	2.655	2.879	3.233	3.559	4.236
N=	42	1.632	1.689	1.749	1.814	1.883	1.957	2.038	2.127	2.227	2.341	2.477	2.643	2.866	3.219	3.544	4.217
N=	43	1.624	1.681	1.741	1.805	1.874	1.948	2.028	2.117	2.217	2.331	2.466	2.632	2.854	3.205	3.529	4.200
N=	44	1.616	1.673	1.732	1.797	1.865	1.939	2.019	2.108	2.207	2.321	2.455	2.621	2.842	3.192	3.515	4.183
N=	45	1.609	1.666	1.725	1.789	1.857	1.930	2.011	2.099	2.198	2.311	2.445	2.610	2.831	3.180	3.501	4.167
N=	46	1.602	1.658	1.717	1.781	1.849	1.922	2.002	2.090	2.189	2.302	2.435	2.600	2.820	3.168	3.488	4.152
N=	47	1.595	1.651	1.710	1.774	1.841	1.915	1.994	2.082	2.180	2.293	2.426	2.590	2.809	3.156	3.475	4.137
N=	48	1.588	1.644	1.703	1.767	1.834	1.907	1.986	2.074	2.172	2.285	2.417	2.581	2.799	3.145	3.463	4.123
N=	49	1.582	1.638	1.696	1.760	1.827	1.900	1.979	2.066	2.164	2.276	2.408	2.572	2.789	3.134	3.452	4.110
N=	50	1.576	1.632	1.690	1.753	1.820	1.893	1.972	2.059	2.157	2.268	2.400	2.563	2.780	3.124	3.440	4.096
N=	55	1.548	1.603	1.661	1.723	1.790	1.861	1.939	2.026	2.122	2.232	2.363	2.523	2.738	3.077	3.390	4.037
N=	60	1.524	1.579	1.636	1.698	1.764	1.835	1.912	1.997	2.093	2.202	2.331	2.490	2.702	3.038	3.347	3.987
N=	65	1.504	1.558	1.614	1.676	1.741	1.811	1.888	1.972	2.067	2.175	2.303	2.460	2.671	3.003	3.309	3.943
N=	70	1.485	1.539	1.595	1.656	1.721	1.791	1.867	1.951	2.045	2.152	2.279	2.435	2.643	2.973	3.277	3.905
N=	75	1.469	1.523	1.579	1.639	1.704	1.773	1.848	1.932	2.025	2.132	2.257	2.412	2.619	2.947	3.248	3.871
N=	80	1.455	1.508	1.564	1.624	1.688	1.757	1.832	1.915	2.007	2.113	2.238	2.392	2.598	2.923	3.222	3.841
N=	85	1.442	1.495	1.550	1.610	1.674	1.742	1.817	1.899	1.991	2.097	2.221	2.374	2.579	2.902	3.199	3.815
N=	90	1.431	1.483	1.538	1.598	1.661	1.729	1.804	1.885	1.977	2.082	2.206	2.358	2.561	2.883	3.178	3.790
N=	95	1.420	1.472	1.527	1.586	1.649	1.717	1.791	1.873	1.964	2.068	2.191	2.343	2.545	2.865	3.159	3.768
N=	100	1.410	1.462	1.517	1.576	1.639	1.706	1.780	1.861	1.952	2.056	2.178	2.329	2.531	2.849	3.142	3.748
N=	110	1.393	1.445	1.499	1.558	1.620	1.687	1.760	1.841	1.931	2.034	2.156	2.305	2.505	2.821	3.111	3.712
N=	120	1.378	1.429	1.483	1.542	1.604	1.670	1.743	1.823	1.913	2.015	2.136	2.285	2.483	2.797	3.085	3.681
N=	130	1.365	1.416	1.470	1.528	1.589	1.656	1.728	1.808	1.897	1.999	2.119	2.267	2.464	2.776	3.062	3.655
N=	140	1.353	1.404	1.458	1.516	1.577	1.643	1.715	1.794	1.883	1.984	2.104	2.251	2.447	2.757	3.042	3.631
N=	150	1.343	1.394	1.447	1.505	1.566	1.632	1.703	1.782	1.870	1.971	2.090	2.236	2.432	2.740	3.024	3.610
N=	160	1.334	1.385	1.438	1.495	1.556	1.621	1.693	1.771	1.859	1.960	2.078	2.224	2.418	2.726	3.008	3.591
N=	170	1.326	1.376	1.429	1.486	1.547	1.612	1.683	1.761	1.849	1.949	2.067	2.212	2.406	2.712	2.993	3.574
N=	180	1.318	1.368	1.421	1.478	1.538	1.603	1.674	1.752	1.840	1.940	2.057	2.202	2.395	2.700	2.980	3.559
N=	190	1.311	1.361	1.414	1.471	1.531	1.596	1.666	1.744	1.831	1.931	2.048	2.192	2.385	2.689	2.968	3.545
N=	200	1.305	1.355	1.407	1.464	1.524	1.589	1.659	1.737	1.824	1.923	2.040	2.184	2.375	2.678	2.957	3.532
N=	250	1.279	1.329	1.381	1.437	1.496	1.560	1.630	1.707	1.793	1.891	2.006	2.148	2.338	2.637	2.912	3.480
N=	300	1.261	1.310	1.361	1.417	1.476	1.540	1.609	1.685	1.770	1.867	1.982	2.123	2.311	2.608	2.880	3.443
N=	400	1.235	1.284	1.335	1.390	1.448	1.511	1.580	1.655	1.739	1.835	1.949	2.088	2.274	2.567	2.836	3.392
N=	500	1.218	1.266	1.317	1.372	1.430	1.492	1.560	1.635	1.719	1.814	1.926	2.065	2.249	2.540	2.807	3.358
N=	600	1.205	1.253	1.304	1.358	1.416	1.478	1.546	1.620	1.703	1.798	1.910	2.048	2.231	2.520	2.785	3.333
N=	700	1.196	1.244	1.294	1.348	1.406	1.468	1.538	1.609	1.692	1.786	1.898	2.035	2.217	2.505	2.769	3.314
N=	800	1.188	1.236	1.286	1.340	1.397	1.459	1.526	1.600	1.683	1.777	1.888	2.024	2.206	2.493	2.756	3.299
N=	900	1.181	1.229	1.279	1.333	1.390	1.452	1.519	1.593	1.675	1.769	1.880	2.016	2.197	2.483	2.745	3.286
N=	1000	1.176	1.224	1.274	1.327	1.385	1.446	1.513	1.586	1.669	1.762	1.873	2.009	2.189	2.474	2.736	3.276
N=	9999	1.110	1.156	1.205	1.258	1.313	1.373	1.438	1.510	1.590	1.681	1.788	1.920	2.095	2.372	2.625	3.147
N=	50000	1.093	1.140	1.188	1.240	1.296	1.355	1.420	1.491	1.570	1.661	1.767	1.898	2.072	2.346	2.598	3.116